

PROGRESSIVE
MEDICINE





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PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

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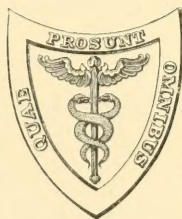
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VOLUME I. MARCH, 1912

SURGERY OF THE HEAD, NECK, AND THORAX—INFECTIOUS DISEASES, INCLUDING
ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA
—DISEASES OF CHILDREN—RHINOLOGY AND
LARYNGOLOGY—OTOLOGY



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PROGRESSIVE MEDICINE

MARCH, 1912

SURGERY OF THE HEAD, NECK, AND THORAX

BY CHARLES H. FRAZIER, M.D.

THE BRAIN

The Hypophysis. HISTORICAL. In 1886 a lively interest was first aroused in the pathology and physiology of the hypophysis cerebri by Pierre Marie, who, in a monograph on acromegaly, attributed the cause of that disease to an abnormal condition of the hypophysis. In 1901 there appeared an important work by Frölich's in which it was proved that tumors of the hypophysis were often not accompanied by acromegaly but merely by local symptoms, such as headaches and ocular disturbances. The most important contribution to the diagnosis of hypophyseal tumors was made when Oppenheim observed that the enlargement of the sella turcica caused by such a tumor could always be reproduced in the radiograph, and his observations were confirmed by v. Fuchs, Holzkecht, v. Schüller, and Erdheim. Horsley had proved by his experiments on animals that the removal of the hypophysis was not incompatible with life, and this paved the way for the introduction of surgery into the field. Indeed, it was Horsley who first removed an hypophyseal tumor from the human subject, but the technique which he suggested and successfully practised—approaching the pituitary body through the middle cranial fossa—was so difficult in other hands that no one else ventured into this field. With the exception of Horsley's earlier experiences, the surgery of the hypophysis may be said to have had its advent in 1906, when Schloffer published his article entitled, "Zur Frage der Operationen an der Hypophyse," in which he described the technique of the extra-cranial method of approach. The next year he performed the first operation for the removal of a tumor by this route with results not altogether satisfactory, for, although the headaches disappeared, the ocular disturbances were not influenced, and the patient died

two and one-half months after the operation. A few months later, v. Eiselsberg performed an operation according to Schloffer's method with more encouraging results, and the next year still greater interest was aroused in the subject when Hochenegg removed an hypophyseal tumor from a patient suffering from acromegaly with very beneficial effects. The seeming mutilation of the face incident to the technique of the Schloffer method shocked the sensitive nature of many neurologists, who shrank from subjecting their patients to such vivisection. Fortunately it was not long before Kanavel elaborated his intranasal route, which has with certain modifications been adopted almost universally, and has done more than any other one fact to raise the surgery of the hypophysis to a plane where, in the matter of relative risks, it compares favorably with many other major surgical procedures. To Pierre Marie, Frölich, Oppenheim, Horsley, Schloffer and Kanavel we must credit the contributions which count for most in the sum total of what has been accomplished in the study and treatment of hypophyseal lesions.

GENERAL CONSIDERATIONS. A discussion *in extenso* of the clinical syndrome must be left to the neurologist; suffice it to say that more intimate knowledge of the function of the several constituent parts of the gland must be acquired before a clear and concise clinical picture can be drawn representing various expressions of disease arising from lesions of one part of the gland or another. Of the two constituent parts, the anterior lobe is probably the most important; its secretion empties directly into the circulation, while the secretion from the posterior lobe empties into the cerebrospinal space. The latter secretion contains certain active principles, though of much less importance to the maintenance of the physiological equilibrium than the secretion of the anterior lobe. In general, it may be said that the various clinical manifestations are the result of hyperactivity on the one hand, and hypoactivity on the other, perversions of physiological activity similar to those observed in diseases of the thyroid gland. Hypoactivity of the hypophysis leads, as does hypoactivity of the thyroid gland, to various disturbances of development and growth. Picture the myxedematous child on the one hand, and the short, excessively fat, growing child or young adult with the stigma of undeveloped genitalia and other defects. In marked distinction to this expression of hypophyseal disease, we have the antipathy of hypoactivity in the hyperactivity of acromegaly.

Of the lesions which may lead to these perversions of glandular activity we have but a limited knowledge. We have yet much to learn about the ductless glands and their internal secretions, and in the case of the hypophysis we have no definite knowledge as to what influences its physiological activity (although no doubt they involve certain processes of a chemical nature) save the gross interference

caused by the presence of tumors. We know that tumors of the posterior lobe are rare, there being only about six such cases recorded, and tumors of the intermediary part have only been reported three times. Most common are those of the anterior lobe, which are usually either adenomata or Erdheim's tumors. Most of these adenomata are benign and of slow growth, while a few are infiltrating and may be called malignant.

As in tumors involving other parts of the brain, so with hypophyseal tumors, we have two groups of phenomena—those which may be said to be focal and those general in character. Of the latter there is the usual picture of headache, vomiting, and disturbance of vision, and of the former, the acromegaly or the dystrophy as the case may be, the hemianopsia, enlargement of the sella turcica and so on.

EXPERIMENTAL PHYSIOLOGY. During the last year, Horsley and Handelsmann¹ have made some very interesting experimental investigations on the pituitary body, which have caused us to reconsider carefully the much disputed question of the vital importance of this gland. Since 1886, when Horsley first began his investigations on the hypophysis, various experiments have been performed to determine the effects of the complete or partial removal of this gland. Stederius, Gemelli, Aschner, and Ascoli hold that death does not necessarily follow the removal of the pituitary body, but that the gland is at least essential in development, while, on the other hand, the research work of Legrain, Paulesco, Cushing, and others, has led these writers to maintain that complete extirpation of the gland is entirely impossible without fatal results. According to these, total removal of the hypophysis leads inevitably to the death of the animal with a peculiar and characteristic train of symptoms—cachexia hypophyseopriva, that is, low temperature, slow respiration, typical flexion attitude of back and incurvation of tail, spasmodic opening of the jaws; the animals are drowsy, lethargic, anesthetic to a painful stimulus, and finally pass into deep coma. Sometimes, however, death does not occur as promptly as Paulesco claimed, for puppies may remain in an apparently normal condition for at least three weeks before the terminal phenomena appear, and the latter may persist for from one to three days.

In direct contradiction Horsley's recent experiments with Handelsmann confirm his earlier observations and those of others, namely, that total extirpation is not incompatible with life. In their experiments on 54 animals, including 20 cats, 21 dogs, and 13 monkeys, the hypophysis was removed in most cases by the temporal method, with the opening of the skull only on the left side, the palatal method being employed only in the cat. Sometimes the gland was not removed, but merely separated from the base of the brain, and sometimes the

¹ British Medical Journal, November 4, 1911.

infundibulum was cauterized. The cerebral symptoms which were observed in half the cases—*mouvements de menège*, hemiparesis, hemianopsia, and, in monkeys, temporary ophthalmoplegia on the side of the operation—soon disappeared. There was complete extirpation of the hypophysis cerebri (pars anterior, pars posterior, and pars intermedia fissuræ) in 15 cases (2 cats, 9 dogs, and 4 monkeys), of which 8 animals died within forty-six hours from shock, hemorrhage, or infection, and 3 within four days. None of the "characteristic" symptoms described by Cushing were observed. Of the 4 still surviving cases, all of which were monkeys, 3 became asthenic and died naturally on the 13th, 14th, and 39th days, and the fourth was killed in good condition on the 115th day.

As regards viability after removal of the anterior lobe, Horsley and Handelsmann have come to conclusions differing widely from those reached by Cushing; the former found that in 3 cases the animals survived in good health after complete extirpation of the pars anterior, while Cushing holds that the pars anterior is the essentially vital part of the gland. Horsley and Handelsmann obtained a considerable number of complete survivals in all the classes of animals examined—that is, cats, dogs, and monkeys—and in whom, postmortem, minute fragments of one or other of the parts of the gland were found enclosed in the fibrous scar occupying the interpeduncular region. These, for the most part, preserve the normal appearance of their constituent cells. Occasionally they are atrophied. The full discussion of their histological changes will be given later, but it is clear that in some cases the remains found can hardly with justice be accredited with the survival.

The physiological importance of the pars anterior may be considered in conjunction with the hypophysis that it furnishes hormones for subsequent treatment by the rest of the gland. Such a view has been supported by Herring and others in their contributions on the *importance of the infundibulum* as a duct and channel of transference of the products of the really active lobe, the pars posterior.

OPERATION. The problems that present themselves in the management of hypophyseal lesions are various. In the first place, we must consider always the propriety of a temporal decompression as a means of relieving the violent headache, although the operation will have very little effect upon the visual disturbances owing to the proximity of the tumor to, and the direct involvement by, pressure upon the optic commissure. In one respect tumors of the hypophysis lend themselves favorably to surgical therapy because a considerable number are benign in character; in another respect these tumors present many difficulties because of their inaccessibility. What may be said of the palliative and radical treatment of tumors of the brain generally applies to tumors of the hypophysis, but I have often thought,

perhaps with this distinction, namely, that a decompression directly beneath the tumor, by removing the floor of the sella turcica, offers a larger measure of relief and one of longer duration than a similar procedure in other regions of the brain. This is due to several factors; first, the inability for the tumor to expand (surrounded as it is almost entirely by the walls of the sella turcica), except in one direction, upward, subjects the hypophysis to considerable pressure which may be relieved adequately only by removing the floor of the "sella;" secondly, the slow growth or the spontaneous arrest of the tumor growth ensures relief of longer duration, if not absolutely permanent. I believe for the time being we should be content in many instances with this "sella" decompression, at least putting off the final stage of the operation until it is found that the symptoms either have not been relieved or, if relieved temporarily, show signs of recurrence.

We have already spoken of the development of the technique beginning with Horsley's temporal approach, now abandoned, and ending with Kanavel's intranasal method, now generally accepted. I have often thought that the operation might well be relegated if necessary, perhaps to advantage, to the operating rhinologist, and I was not at all surprised to see during the past year that some of these specialists, notably Hirsch, had operated upon a number of cases. The rhinologist is thoroughly familiar with operations on the sphenoidal cells, and it is only a short step from these to the hypophysis. The rhinologist is accustomed, furthermore, to working with artificial light through the contracted space of the nasal cavities, and is familiar with the various preliminary steps, resection of the septum, turbinates, walls of the sphenoidal sinus, etc. It is rather interesting to observe that these specialists have pointed out to the surgeons that the operation can be done under local anesthesia, and in course of time no doubt many additions to the technique, especially in matters of minor detail, will emanate from this source. (For description of Kanavel's method, see *PROGRESSIVE MEDICINE*, March, 1911, p. 66.) Although, since Kanavel's method was introduced, many "Schloffer" operations have been performed, I believe the technique of the latter will in time be altogether abandoned.

Hirsch¹ has performed four operations for the removal of hypophyseal tumors. According to his first method, namely, the broad opening of one sphenoidal cavity, he has operated once in a case of cystic tumor. The cyst was evacuated, and a small part of the wall removed, with the result that the patient gained normal acuteness of vision in the right eye at the end of seven months, though the left was and continued to be amaurotic.

He has operated three times according to his second method, which he now prefers and which consists in the submucous resection of the

¹ *Arch. für Laryng. u. Rhin.*, 1911, vol. viii, No. 24.

septum and the subsequent opening of the two sphenoidal cavities. In the first of these 3 cases the hypophysis was exposed and the tumor laid free through an opening in the dura, but it was not removed according to the advice of v. Wagner. The acuteness of vision of the left eye increased, however. In the second case, he was able merely to make a gap about the size of a pea in the hypophyseal eminence. A part of a tumor about the size of a cherry was removed in the third case, and in six weeks the acuteness of vision of the right eye rose from 0.2 to 0.5.

In another paper, Hirsch¹ describes the successful removal of a hypophyseal tumor in a woman, aged fifty-seven years, who had been suffering from very poor eyesight and pressure in the head for four years previous to the operation. He first resected the left middle turbinated bone; after a few days he opened the posterior ethmoid and the sphenoidal cells. About a month later he proceeded to the hypophysis operation proper. The mucous membrane of the anterior sphenoidal walls and that of the septum having been cocainized, he loosened the mucous membrane on both sides of the septum by means of an incision on the right side, and proceeded to the resection of the cartilaginous and bony septum on the anterior walls of the two sphenoidal sinuses. Having loosened the mucous membrane here also, he succeeded in laying the tumor of the hypophysis free, after first opening the sphenoidal sinuses with a chisel. At this juncture, a pledget saturated in cocain was placed in the sinus; and the hypophyseal tumor was uncovered by splitting the dura. About two tablespoonfuls of a blood-tinged fluid escaped, the tumor pulsating rapidly all the while. After this evacuation nothing was to be seen of the tumor except the dural covering, which was removed. A tampon of iodoform gauze was introduced and removed on the fifth day. At the end of a week the patient was discharged, her vision having improved so much that she could read and write with ease.

Kümmel² operated upon a young woman, aged twenty-eight years, who had suffered from pressure in the head, optic atrophy with almost complete blindness, in addition to the symptoms of acromegaly. The operation was performed with the head suspended, with the anesthetic intravenously administered. Upon opening the sella turcica, a sarcoma about the size of a walnut and of soft consistency was found and removed. The patient, however, did not survive the operation, which was especially to be regretted, as the autopsy showed that the tumor had been completely removed.

Results. No attempt has been made as yet to summarize the results of all the operations upon the hypophysis. Melchoir³ found record

¹ *Wien. med. Woch.*, 1911, vol. lxi, p. 650.

² *Deutsch. med. Woch.*, 1911, vol. xxxvii, p. 189.

³ *Berlin. klin. Woch.*, August 7, 1911.

of 41 Schloffer operations. The immediate results have been most gratifying, especially in acromegaly cases, in which the hands, feet, and face have begun to decrease in size almost immediately. As to the ultimate results, 4 cases are said to be steadily improving, two years after the operation. In a series of 36 Schloffer operations there were 12 deaths, only 3 of which were due to meningitis.

Cerebral Decompression. The development of every operation usually passes through three stages: First, its inception, with perhaps a single clinical observation to substantiate the claim of the proposer; then, a little later, the idea being eagerly grasped by those interested in the special problem involved, a number of reports follow rapidly one after another, as the authors hurry into print with the records of cases so recently operated upon that none but the immediate effects of the operation have been observed. Finally, after a period of years, there appear contributions with the mature and deliberate reflection born only of the experience which comes from a considerable number of cases and a corresponding period of years. Such, it seems to me, is the history of the development of cerebral decompression, so-called, and at this juncture we have passed through the two earlier periods of immaturity and have reached the stage at which we can view the operation from every aspect and form an intelligent opinion in the light of experience.

In this, as in the inception of many other therapeutic measures, the first cue was taken from nature, where it was seen that pressure atrophy, or direct invasion of the skull by tumors, was followed in some instances by very positive relief.

Reviewing the subject of decompression as applied to epilepsy, trauma, and tumor, Frazier¹ gives the following summary: The fatal tendencies of cerebral contusion, with or without basal fracture, are in no wise averted by decompression. Cerebral decompression, in the experience of the author, has no more influence in any form of epilepsy than that of operations *per se*. In decompression without exploration, the element of uncertainty as to the diagnosis must be given due allowance when compiling statistics. Internal hydrocephalus, meningitis serosa, and other conditions may so simulate tumor that the real nature of the affections is not determined unless revealed at autopsy. Whenever a general anesthetic is contraindicated, temporal decompression should be performed under regional anesthesia by an alcoholic injection into the third division of the trigeminal nerve. In critical cases with excessive tension, experimental and clinical evidence indicates that no more immediate benefit is derived from a bilateral than a unilateral opening; and, secondly, that a contralateral opening gives no appreciable relief to the state of tension on the opposite side.

¹ University of Pennsylvania Medical Bulletin, vol. xxiii, No. 12.

From observations in the experimental laboratory it has been found that a pretemporal or temporal opening as effectually relieves the tension as one in the subtemporal or suboccipital region. In the selection of cases for decompression, exclude those with coma or stupor, either periodic or continuous, as they are both indicative of the terminal stage of the disease and are not influenced, as are other symptoms, by an artificial opening. Simple decompression without exploration in properly selected cases is so free from risk that the danger of operation *per se* need not be reckoned with when dealing with a condition evidently fatal and often calling for immediate relief. The expectation of life varies according to the seat and character of the tumor. In the author's experience, the survivals include periods of three, four, and six years. After decompression, headache, vomiting, and vertigo are relieved altogether or in large measure in most cases. In patients afflicted with papilledema, ultimate blindness is almost always sure to result unless in the earlier stages the brain is decompressed. When performed early, the prognosis as to sight is most favorable. Decompression properly executed and judiciously employed has survived the period of probation and has more than substantiated the forecast of earlier writers.

Lewandowsky¹ reports two operations performed by Braun, in which very favorable and permanent results were obtained. The first was the case of a woman, aged thirty-six years, who suffered from severe headaches, epileptic seizures, paralysis of the left side, and almost total aphasia. Upon the removal of a portion of the skull from the upper temporal and lower parietal region, the patient began immediately to improve, and has continued to do so until now—four years after the operation—she can go about her work and only suffers from slight reflex disturbances on the right side. This was probably a case of brain tumor. The second case, a young man, aged twenty years, who had sustained an injury to the right side of the head, was operated upon by Braun two years after the injury. An osteoplastic flap was removed from the temporal region; the dura was found somewhat adherent, but there were no signs of meningitis. The flap was replaced, and from that time on the severe headaches, which the patient had suffered, disappeared, and he was able to resume his occupation.

In a case of probable tumor of the brain reported by Lloyd and Spellissy,² a decompression operation was performed five years ago, and, as a result, the patient's eyesight has been saved and the usual distressing symptoms greatly ameliorated. The operation consisted in the removal of a large osteoplastic flap from the right Rolandic area. Marked intracranial pressure existed, but no tumor was found, and the flap was replaced. The paralysis and the occasional epileptic

¹ Ther. Monats., April, 1911, p. 209.

² Journal of Nervous and Mental Disease, May, 1911.

attacks still continue, but the patient's mental condition is improved, and his vision is good. The case demonstrates very forcibly the efficacy of cerebral decompression in mitigating the terrible suffering of those who have tumors of the brain which either are not to be located, or, if located, are deemed inoperable.

Brain Puncture. Puncture of the brain has never been received with favor in this country. It was first advocated, and has been quite generally adopted in Germany as a diagnostic measure in doubtful cases. The custom of postponing operation until a positive diagnosis can be made in the management of brain tumor cases has worked untold harm in hundreds of instances and is responsible for the only too numerous cases of optic atrophy which could have been prevented had the operation been performed when the first suspicion was aroused as to the existence of a tumor. The larger my experience, the more convinced I am that surgeons should take just as firm a stand in recommending exploratory operation for lesions of the cranial, as they do for lesions of the abdominal, cavity. It is just as important in one as it is in the other, if we are to increase the number of operable lesions and give to the patient the greatest measure of relief that surgical therapy affords. There may be no absolute objections to resorting to brain puncture, although the procedure is of itself not without risk, but the failure to find a lesion by this method should not contraindicate operation when there are other substantial grounds for making the diagnosis. Out of 12 cases in which the method was resorted to by Pfeifer,¹ the clinical diagnosis was confirmed in 3, and doubtful ones were corrected in 7 cases. There is always the danger of injuring arteries and of infection, but this is more than counterbalanced by the greater success which attends the removal of tumors, made possible by an earlier diagnosis. Out of 14 cases operated upon at Halle, 3 are still living five years after the operation. The technique is fairly simple. The borers used to perforate the skull are about 3 mm. broad and operated by electricity. The needles are graduated and made of platinum-iridium, the point sloping and blunt and about 1.3 to 1.5 mm. thick, the lumen being at least 1 mm. in diameter. To keep out fragments of bone or blood, the silver wire stylet should be left in the needle until it passes through the dura. A syringe is then attached to the needle and the latter introduced to a depth of 3 or 4 cm. As the needle is withdrawn, the operator creates suction by withdrawing the piston of the syringe. To overcome the difficulty of finding the opening made with the cannula, Borchardt² has devised an ingenious method. The scalp is held firmly down on the cranium by means of a disk, to which are attached four chains that are held down securely by the assistants. In the disk there is a small hole just the size of the borer and cannula,

¹ British Medical Journal, September 30, 1911.

² Berlin. klin. Woch., March 27, 1911.

and through it the borer is driven by means of a hand-boring machine. When the borer is withdrawn, the cannula is inserted. Borchardt has used the apparatus with success on both the cerebrum and cerebellum, and strongly recommends its adoption. He feels that puncture of the brain is an important aid in diagnosis and localization, but that it should only be tried when other less dangerous methods have failed.

PUNCTURE OF THE CORPUS CALLOSUM. It is held by many that excessive secretion of cerebrospinal fluid may be brought about by functional disturbances of the nervous system, and many attempts have been made to attribute attacks of migraine, epilepsy, and even katatonia to some disturbance in the secretion of fluid in the ventricles. It has been found that, by puncturing the corpus callosum, the excessive pressure will be relieved and the communication of the ventricles with the entire subdural space is once more established. Puncture of the corpus callosum may be effective, however, in other ways than by the mere mechanical relief of tension. By this means cerebrospinal fluid may again reach the ventricles and pass from them into the subdural space. Anton¹ recommends the operation in cases of hydrocephalus, brain tumor, as a means of exploring the ventricles and of noting any slight changes in form or any abnormal resistance.

Von Bramann² reports 51 cases of puncture of the corpus callosum with not a single death resulting from the operation. Twenty-seven times it was done for the relief of tumors in various regions of the brain, 18 times for hydrocephalus, and six times for epilepsy and other abnormal conditions. In cases of tumor, great benefit was derived—the headache, dizziness, and other distressing symptoms either entirely disappeared or were greatly ameliorated—and in all cases, except where the tumor was at the base of the brain, the eyesight was greatly improved. The operation has been a benefit in cases of hydrocephalus, and has proved of great value for diagnostic purposes in all sorts of abnormal conditions of the brain. His technique is as follows: An incision, about 3 cm. long, is made in the scalp, about a finger's breadth behind the coronal suture in the median line over the parietal bone. After pushing back the periosteum, a button of bone is removed about 1.5 cm. from the median line. An incision of 2 to 3 mm. is made in the dura, and a silver cannula of 2 to 3 mm. in diameter is inserted. The brain substance is penetrated as far as the corpus callosum, the latter is punctured, and about 15 to 20 grams of fluid allowed to escape. The cannula is then withdrawn, and the dura and soft parts sutured.

HEMOSTASIS. The control of bleeding during operations for lesions of the brain is a matter of the utmost importance. If bleeding is controlled as it should be, and the anesthetic carefully administered,

¹ Wien. klin. Woch., December 1, 1910.

² Zentralbl. für Chirurgie, July 22, 1911.

the prospects of recovery are much brighter, and the various steps of the operation may be carried out with the care, delicacy, and precision so essential. In craniotomies for pretentorial lesions, I have found a tourniquet of heavy rubber tubing meets every indication and is in every way more reliable than the more complicated appliances, of which there are a number. In the suboccipital craniectomy for subtentorial lesions, the Heidenhain stitch applied from one mastoid process to the other, one-half inch above the line of the incision, adequately controls bleeding from the superior margin of the incision, while hemostats are readily applied on the lower margin as the flap is reflected. Bleeding from the edges of the bone section may be checked by Horsley's wax. In the clinic at Bonn, a *special clamp* is used which has been described by Makkas.¹ It is constructed with two parallel blades 6 to 7 cm. long, which close automatically upon each other by means of a spring. The lower blade of the clamp is about 4 mm. wide and tapers to a point, while the upper blade is blunt, twice as broad as the former, and has on the inner edge a groove running lengthwise into which the lower blade closes. These clamps can be easily made to correspond to the convexity of the skull. Twelve clamps are considered sufficient for the largest openings. A strong pair of pincers is needed to open the clamp. The lower blade which is held open by the pincers is applied under the pericranium, the pincers are then withdrawn, and the blades compressed. Occasionally it is found necessary to place a Heidenhain ligature at the angle of one of the openings. The clamps cannot be used in operations to expose the cerebellum where the cervical muscles compose the base of the flap, but in all pretentorial cases they are regarded by Makkas as superior to other appliances, because of the rapidity with which they can be applied and the thoroughness with which they check bleeding.

Another method of checking bleeding in operations on the cranium is the so-called *adrenalin anemia*, the technique of which, as described by Braun,² is identical with that for local anesthesia. A row of wheals is made in a circle about the field of operation, with a solution of novocain, containing a small amount of adrenalin. The circle should be large enough to provide amply for the incision. In the course of five or ten minutes the adjacent area will be not only anesthetic but bloodless. This method will not always control hemorrhage from the larger arteries, which may need clamping, but is most effective in parenchymatous bleeding. Unlike other hemostatic methods, adrenalin anemia can be used, according to Braun, equally well where the skull is covered with thick muscular tissue, although here a cross-section of the muscle must be injected with the fluid. It is said to be especially advantageous in operations on the cerebellum. Braun has used this method for

¹ Zentralbl. für Chirurgie, December 3, 1910, p. 1545.

² Deutsch. Zeits. f. Chirurgie, November, 1910, p. 563.

several years and finds that it does not in the least interfere with wound repair.

A method of occluding vessels inaccessible to ligature, especially for the occlusion of the middle meningeal artery during the avulsion of the trigeminal root, and for the occlusion of vessels passing from the brain substance to a tumor during the enucleation of the latter, has been described by Cushing.¹ The method is somewhat analogous to the application of the Mikell clamps in the closure of wounds. Small U-shaped wire clips are applied with a specially constructed clamp in whose blades are indentations into which the wire clip fits. There are little transverse grooves on the under side of the clips so that they will not slip off the surface to which they are fastened. The clips, all the same size, are loaded on a magazine, from which they are picked up individually by the holder. The latter locks by means of a catch, and its jaws close sufficiently to pick up one of the wire clips. When the wire clip has been flattened against the bleeding point, the holder unlocks itself.

Hydrocephalus. Three years ago Payr² described a new method of draining the lateral ventricles into the longitudinal sinus by means of a freely transplanted vein or artery in cases of hydrocephalus. He has changed his method of procedure somewhat, and prefers to establish communication between the posterior cornu of the lateral ventricle and the internal jugular or facial vein. For this purpose, he recommends the use of a calf's artery (anterior or posterior tibial preferred) prepared in paraffin and formalin, which forms a very excellent drainage-tube, passing through a subcutaneous canal from the back of the head to the side of the neck. In their extracerebral course, these arteries are covered with freshly transplanted human veins, preferably the long saphenous. The technique is fairly simple. Several days before the operation Payr advises puncture of the brain to ascertain the amount of pressure, if possible, and the distance of the ventricle from the surface. At the point of puncture a small flap is reflected and a trochar passed through into the ventricle. The arterial tube is then inserted the proper distance through the canal thus formed into the ventricle. It is then drawn through the saphenous vein, and the artery and vein are together carried subcutaneously down to the point at which communication with the facial or internal jugular vein is to be established. The distal end of the artery with its venous covering is inserted into the peripheral end of the chosen vein and secured in place with a ligature. One may begin the operation by establishing the communication first with the ventricle, or, working from below upward, complete first the anastomosis with the vein. The flow of the fluid must be very gradual. In addition to drainage into the veins, Payr used drainage

¹ *Annals of Surgery*, July, 1911, p. 16.

² *Archiv für klin. Chir.*, August 26, 1911, vol. xcv, No. 4.

into the subarachnoid, subdural, and subaponeurotic spaces, into the loose connective tissues, and into the cavities of the body. He also advocates puncture of the corpus callosum, repeated lumbar puncture, and puncture of the ventricles in some instances. The latter method he finds most successful in children under two years of age, and in cases of hydrocephalus accompanied by meningitis. In all other cases of hydrocephalus, he strongly recommends drainage of the ventricles into the veins. Payr has performed 18 operations for the relief of hydrocephalus, with 7 deaths (38.8 per cent.). Two deaths were due to too rapid escape of fluid, 1 to primary infection, and 4 to secondary infection. Payr reports 3 cases operated upon between one and three-quarter and two and three-quarter years ago, which have proved very successful. The eyesight was restored, the head decreased in size, and there was marked improvement both mentally and physically.

In Marmion's¹ operation we have still another method of draining the lateral ventricles, namely, into the tissues of the parotid gland. The latter he chose because of its liberal supply of lymph vessels. The child, only eight months old, died three months after the first operation of acute enteritis. But the head had continued to decrease in size and there had been no wound complications. The following is a brief description of the operation: The lines of the superior longitudinal sinus, as well as the Rolandic and Sylvian fissures, are marked on the scalp with iodine. Then a very strong needle, about 14 cm. long and supplied with double No. 5 silk, was introduced at the posterior segment of the right frontal lobe, exactly 2 cm. to the sides of the superior longitudinal sinus, through the skin, galea, periosteum, dura, and brain directly into the ventricle. The needle is so directed that it leaves the ventricle and brain on the margin of the speech centre and is pushed forward until it reaches the surface again. The silk is seized with pincers and the needle withdrawn. The two ends of silk at the upper opening are knotted and covered with sterile cloth; the needle is then threaded with the free ends and tunnels the subcutaneous tissue to a point half-way down to the parotid, where it is brought to the surface through a small incision, and again carried along the plane of subcutaneous tissue to the surface of the parotid. The free ends of the silk were tied and left in the substance of the parotid gland and the severe cutaneous wounds closed with sutures. The cerebrospinal fluid began to flow rapidly, the size of the head decreased, the child became quiet, and the eyeball and cornea returned to normal condition. Two months later the operation was repeated on the left side near the temporosphenoidal lobe.

A case in which drainage of the subdural space was accomplished with glass instead of gold or platinum, is described by Andrews.² The

¹ Zentralbl. für Chirurgie, August 12, 1911.

² Surgery, Gynecology, and Obstetrics, August, 1911.

patient was a fairly healthy child up to the age of nine years, when he was seized with severe headaches and his head began to swell, until at the age of twelve years it measured twenty and one-half inches in circumference; he developed papilledema and ultimately complete optic atrophy. At this time (1897) Murphy punctured the velum, and large quantities of fluid escaped from the fourth ventricle. The patient was free from symptoms for a number of years, but in 1906 there was a recurrence, and the case came under the care of Andrews, who proceeded as follows: An incision was made at Keen's point, a button of bone removed, and as little as possible of the cerebrospinal fluid withdrawn. As the extraordinary size of the patient's head made the use of gold tubes of the length usually recommended (one and one-half to one and three-quarter inches) impossible, Andrews improvised a glass one, flanged at one end, and two and one-half inches long, out of a female catheter. A gush of cerebrospinal fluid ensued upon the insertion of the tube, which was so placed that its flanged outer end rested in the subdural space. The dural wound was closed. The patient was immediately relieved, and has been in good health up to the present time, a period of five years. Andrews attributes the success of the operation partially at least to the use of a glass rather than a metal tube; as the glass tube is of lighter specific gravity there was less likelihood of its becoming displaced and greater assurance of permanent drainage.

A rather extraordinary result followed opening the foramen Magendie in a girl, aged ten years, with acquired hydrocephalus. For several years previous to the operation she had suffered from headaches, vomiting, and impairment of sight. The left abdominal reflexes were absent, and she was in a more or less stuporous condition. Cotterill¹ punctured the lateral ventricle through the right coronal suture, and drew off four to five ounces of fluid, but the operation brought no benefit. He then proceeded to remove a large part of the occipital bone and to reopen the foramen Magendie. A gradual improvement ensued until the patient practically recovered her sight, intelligence, reflexes, and muscular tone.

Tumors of the Cerebellopontile Angle. Of 27 tumors of the cerebrum and cerebellum in v. Eiselsberg's clinic, 12 died of recurrence or tuberculous meningitis a few months later, and 2 died of intercurrent affections. Of 9 cases operated upon during the last year, there were no complete recoveries, and only 3 survived one year. Because of their histological structures, the "acoustic" tumors offer a better prognosis; the majority are gliofibromata. During the past year, 10 cases of "acoustic" tumors were operated upon in v. Eiselsberg's clinic, 1 in one stage by Borchardt's method, 9 in two stages by a suboccipital

¹ Lancet, November 12, 1910.

craniectomy.¹ In the performance of these operations the customary procedure was carried out. The patients were anesthetized first with Billroth's mixture, followed by straight ether. The removal of the posterior rim of the foramen magnum he believes is not unattended with risk; at least both cases in which this procedure was carried out died, one with a frequent, arrhythmic pulse and low temperature, the other of paralysis of the respiratory centre. By the time the bone was removed the pulse was so rapid and feeble that it was not deemed wise to attempt the removal of the tumor until the patient had fully recovered from the effects of the operation, usually six to nine days later. Continuous hypodermoclysis during the operation seemed to have a beneficial effect. The occipital sinus was ligated and the dural flap reflected upward; the division of the sigmoid sinus, although unnecessary, seemed to give a better exposure. In the removal of the tumor, Krause's tube was tried in one case, but it was impossible to prevent the aspiration of normal tissue. In none of the cases was the hemorrhage alarming, and because of the risk of infection (one case died of infection in the third week) drainage was subsequently abandoned. At the conclusion of the operation the dural flap was sutured in place, although not without difficulty, and in several instances portions of the hemisphere protruded between the stitches. Of the wound complications, a fistula formed in one case from which particles of necrotic tissue were discharged and in another drainage case the patient developed a fatal meningitis. Of the postoperative complications, marked ataxia and paralysis of the facial and trigeminal nerves were observed, but these in course of time disappeared to a considerable degree. Twice the tumor was not removed; one patient died of shock complicated with pneumonia; and another, who had a tumor of considerable dimensions, of paralysis. Altogether there were 6 fatalities. The cause of death in 2 has already been alluded to; and of the remaining 4, 1 died of meningitis, 1 had multiple tumors; 1 death was attributed to incomplete exposure, and the other to vagus palsy. There remain of the 10, 4 successful cases, 1 a neuroglioma, and 3 fibrosarcomata. Two of these were operated upon so recently that the end results are still problematical, and the other 2 were entirely free of subjective disturbances and both were able to resume their respective occupations. The mortality of this operation (based upon a series of 41 cases) Leischner places at 70 per cent. The most frequent causes of death are shock and paralysis of the respiratory and circulatory centres. Fifteen survived the operation, and were either entirely cured or considerably improved. To reduce the mortality of this operation, Leischner dwells upon the importance of the most painstaking hemostasis, the gradual relief of intracranial tension, the avoidance of trauma in retrac-

¹ Leischner, *Mitt. a. d. Grenzgeb. der Med. u. Chir.*, Band xxii, p. 675.

tion of the hemisphere to expose the tumor, and the adoption of the two-stage method. The younger the patient, and the smaller the tumor, the more favorable will be the prognosis.

There is little to comment upon in the contribution of Leischner's. In his discussion of the technique, he calls attention to the principal difficulties, and suggests appropriate means of attempting to lower the operative risks. The method of procedure in v. Eiselsberg's clinic differs in but minor details from that ordinarily employed. Because of the proximity of the tumors to the medulla, this operation must be attended with risks not incurred in operations elsewhere in the cranial cavity. Even though no attempt be made to remove the tumor, the mere removal of bone and opening of the dura may so alter the conditions of the intracranial tension as to lead to traction or pressure of the tumors upon the medulla, which of itself may be attended with serious effects. My own experience has taught me that careful anesthetization and the adoption of every means to arrest bleeding, and to arrest it promptly, are perhaps the most important safety factors. These patients bear the loss of blood exceptionally badly, and it is surprising to see how well the first stage of the operation will be borne if little blood is lost—so well in some cases that it is neither necessary nor advisable to resort to the two-stage method. It is, however, a grave question whether one should attempt to remove the tumor when it is firmly attached to adjacent structures, when its removal is so fragmentary that portions of the tumor may be left behind, or when, upon attempting to free the tumor from its base, there is likelihood of injuring the medulla. Under these circumstances one should be content with the effect of decompression which, in my experience, in tumors of the posterior fossa is in every respect more gratifying than in pretentorial lesions. Both the diagnosis of the tumor and its localization are so easy as compared with tumors in many other situations that there is little excuse for the unpardonable delay that is so prevalent, and yet, in the majority of cases, by the time the patient is brought to the surgeon, the optic nerve atrophy is so far advanced that restoration of vision is no longer possible.

Bornhaupt¹ found a tumor in the left cerebellopontile angle, which was easily removed without much hemorrhage. With reference to the effect of removing a considerable portion of the cerebellar hemisphere upon the function of the cerebellum, attention should be called to 2 cases reported by Borchardt before the Surgical Congress in 1908, in which he found it necessary, in order to overcome the tendency to protrusion, to remove a considerable portion of the hemisphere. The cerebellar ataxia, which appeared immediately after the operation, disappeared in both cases in the course of five or six weeks.

¹ St. Petersburg, med. Woch., 1911, xxxvi, p. 5.

In the following series of cases operated upon by Sherman,¹ the development of large hernias is attributed to the fact that the dura was not closed. Whether a large hernia develops or not, it is a bad practice, I think, to suture the dura unless there is some assurance that there will be no recurrence of the lesion, otherwise symptoms of intracranial tension will recur and a second operation will be necessary. If the surgeon secures accurate coaptation in the aponeurotic layer, the herniation will be kept well under control, and should never be larger than what may be necessary to afford relief from pressure.

In Sherman's first case, only the left cerebellar fossa was opened. Immediately upon incising the dura, the cerebellar hemisphere protruded, and a considerable amount of cerebrospinal fluid escaped. The cerebellum, however, diminished in size, as though a cyst in its interior had been emptied and the angle could be explored. In this connection, mention might be made of the fact that there is a large lymph space (basal cysterna) beneath the cerebellar hemisphere. The sudden evacuation of the fluid from this lymph space when the hemisphere is lifted is frequently looked upon as the emptying of a cyst. No tumor was found, and the musculocutaneous flap was closed, leaving the dura unsutured. A large decompression tumor soon appeared, which increased in size up to the patient's death.

In the second case, a cross-bow incision was made. The trephine for the purpose slipped, and a gash about 1.5 cm. long was made in the dura. The angle, however, was exposed and a cyst on the floor of the fossa removed. The wound had to be closed quickly on account of the patient's condition, and the dura was left unsutured. A large decompression tumor developed almost immediately.

In the third case, in which the tumor was pressing on the medulla, Sherman attributes the patient's death to an improper system of artificial respiration. However, in making the incision, the dura mater was nicked as in the previous case. Sherman feels that, owing to the varying thickness of the occipital bone and the lack of diploë in this region, it will be much better to open the bone with a bur or Doyen's perforator. The opening can easily be made larger with rongeur forceps.

Cysts of the Cerebellum. In 1906, Borchardt published a collection of 14 such cases, 13 of which had been greatly benefited by the operation. In a report on the Surgery of the Cerebellum at the Twelfth International Medical Congress in Budapest, Hildebrand emphasized the fact that the prognosis of the operative treatment of cerebellar cysts is more favorable than that of any other tumor of the posterior cranial fossa, there being only 1 death from 20 such operations. Optical disturbances are very apt to remain behind after such operations,

¹ California State Journal of Medicine, March, 1911, p. 125 and 126.

however. Oppenheim and Krause have reported an especially noteworthy case of a double-sided traumatic cyst which recovered. Scholz divides these cystic formations into several groups: (1) Those which have their origin in congenital anomalies of the ventricular system; (2) the simple or serous cysts; (3) those cysts which are remains of softening; (4) those very rare dermoid cysts; and (5) the parasitic cysts. Cassirer and Schmieden¹ report a case in which they found, in the left cerebellar hemisphere, a cyst which was easily evacuated. The cyst did not appear to have any wall, and there was nothing to suggest its origin. The patient was discharged in five weeks much improved. There was no ataxia of the upper or lower extremities, and no facial paralysis. A little more than a year later, she was reported to be in good condition and able to do light housework, although she suffered occasionally from spells of dizziness.

Lumbar Puncture. When practised for the relief of brain tumors in the presence of increased intracranial tension, lumbar puncture has come to be recognized, and rightly so, as a dangerous procedure. Disastrous results have followed when, upon the withdrawal of fluid from the spinal canal, the brain stem is forcibly engaged in the foramen magnum. If proper precautions are adopted, however, the risks may be minimized. I have always insisted that only a small quantity be removed at a time and have always used a manometer with which to measure the pressure. Should any untoward symptom arise, the fluid should be re-injected at once, or the quantity replaced by normal saline solution. Hamburger² was unfortunate enough to lose his patient after lumbar puncture. A woman, aged forty-eight years, had suffered from severe occipital headaches for years, and, in 1910, the pain grew so much worse, especially in the frontal region, that lumbar puncture was resorted to immediately upon her admittance to the hospital in the hope of relieving the pressure and throwing some light upon the diagnosis. Fourteen cubic centimeters of clear, watery fluid were withdrawn, but there was no improvement, and the patient died thirty-seven hours later. At autopsy it was discovered that a portion of the medulla and a bit of the surrounding cerebellum had been wedged into the foramen magnum, and the brain was found to be under great pressure. A firm tumor, a typical endothelioma about the size of a hazelnut, was found attached to the anterior part of the corpus caudatum, and a smaller tumor of the same general character was found in the corpus callosum.

Cranial Fracture. Fractures of the skull present many interesting problems to the surgeon, and his attitude toward them will depend upon whether he is dealing with a fracture of the vault or fracture of the base, and the degree of cerebral contusion that may be present in

¹ Münch. med. Woch., November 22, 1910.

² Surgery, Gynecology, and Obstetrics, December, 1910.

either. The following rules which Hartley¹ lays down are very sound. That fissures which are deep be explored with a drill, to determine the injury to the vitreous plate and to remove foreign matter; that depressed fractures, simple and compound, be raised and the fragments replaced, when perfect hemostasis and asepsis of the wound can be obtained; when the wound is already infected or the injury to the intracranial tissues forbids replacement of the fragments, that the wound be tamponed and allowed to heal by granulation. When feasible, he prefers the re-implantation of the fragments. By this plan of treatment, the immediate results are good in 80 to 90 per cent. of cases. At least 80 per cent. show good results in so far as they remain free from sequelæ. In 10 per cent. there may develop, as permanent end results, headache, vertigo, etc., of a mild degree, and in 6 per cent., although the immediate results are excellent, later such severe disturbances as headaches, epilepsy, etc., develop to such an extent as to incapacitate the patient from work.

When immediate reimplantation is impossible, the wound should be tamponed and the parts loosely sutured, as secondary implantation of the fragments during the first two weeks has given failures in 79 per cent. of the cases. As a routine procedure for the repair of defects, Hartley does not believe in the use of celluloid plates, but sometimes when the fragments cannot be used and the wound can be rendered aseptic, celluloid may be implanted with excellent results. My own experience is quite in accord with this. When the original fragments cannot be used, the König-Müller method should be given preference.

With reference to fracture of the base of the skull, the mortality, according to Hartley, is as high as 90 per cent. in the expectant treatment, and from 27 to 33 per cent. in the operative treatment. In the milder cases, he recommends operation to prevent meningeal adhesions and gliosis of the cortex, with the late traumatic neuroses which ensue, and in the more severe cases, when the patients are unconscious, to save life by relieving tension and preventing inhalation pneumonia. The operative results in the milder cases, with focal signs, give 88 per cent. of recoveries and 12 per cent. mortality.

With Hartley's representation of the fatalities of basal fracture and his recommendation to operate invariably, I cannot agree. In the first place, the mortality of basal fracture should not be higher than 60 per cent. without operation. In the mild cases it is, of course, very much lower than in the more severe cases. I am opposed to routine resort to operation in mild cases because it is not necessary as a life-saving procedure and because, with the lesion of the brain as diffuse as it often is, not only in one, but both hemispheres, there is nothing to be gained by mere temporal decompression—the mere establishment

¹ American Journal of Surgery, December, 1910.

of a temporal opening, usually in the right side—when the most severe lesions may be on the left. What effect can a right temporal decompression have in the prevention of a gliosis of the left hemisphere when, as in the milder cases, there is little appreciable increase of tension? As for the more severe cases, I have yet to see a case where life was saved by the operation. The failure of cerebral decompression to relieve such ill effects of intracranial pressure as are the direct result of cerebral contusion are not difficult to explain. In addition to the more or less diffuse lacerations and hemorrhages, minute as they may be, perhaps the most serious phenomenon of cerebral contusion is the rapidly developing cerebral edema. No matter which theory is accepted as to the development of this edema, we know it to be a progressive process, often without limitations, involving the brain structure as a whole. The course and extent of this process bears a direct relation to the violence of the fracturing force, and the mere establishment of an opening for the relief of tension cannot exert any inhibiting effect upon the process. While the degree of intracranial tension may be intense, death is not attributable solely to this alone, harmful as it may be, but rather to direct injury and involvement of important vital centres, and perhaps also to the circulatory disturbances caused by the more or less intense edema. The condition prevailing in cerebral trauma and cerebral tumor have this essential difference, that, on the one hand, we have a lesion rapidly becoming diffuse and unmanageable in which the vital centres become directly involved; in the other, a lesion involving a limited area, of slow development, involving only indirectly the important vital centres. Decompression in the one case is usually futile, in the other frequently alleviating. At one time I was inclined to believe that by proper differentiation one might select a group of cases midway between the mildest and the most severe, in which the establishment of an opening in the skull and dura might by justifiable, but I am now almost convinced that the fatal course of none can be averted by decompression.

A very unique case of horizontal fracture of the skull, in fact the only such case found in literature, is recorded by Ehrlich.¹ A boy, six years of age, was run over, the wheel of the wagon passing over his head, and brought to the hospital unconscious. The loss of consciousness and the succeeding attacks of vomiting were, however, of short duration. Blood and cerebrospinal fluid came from the right auditory meatus. There was a deep wound behind the right ear, in which could be seen a horizontal fissure in the bone. Above the base of the mastoid process one could feel a sharp edge of bone and above this a depression. There were no motor disturbances. The operation consisted in pushing back the skin, aponeurosis, and periosteum from

¹ *Beit. z. klin. Chir.*, vol. lxxi, No. 2.

a part of the mastoid process which brought into view three fissures running out from a point in the above-mentioned horizontal fissure toward the base of the skull. These two three-cornered, depressed fragments of bone were raised. The entire skull seemed to pulsate, and by means of two small incisions—one above the right eyebrow and one in the temporal region in front of the left ear—the unusual character of the fracture was revealed; a horizontal fissure was discovered on the left side similar to that on the right. The patient was discharged a month after the operation.

Of 614 cases of fracture of the skull which have been admitted to the surgical ward of the City Hospital of St. Louis during the last five years, the following table was prepared by Babler:¹

	Operated.		Not operated.	
	Recovered.	Died.	Recovered.	Died.
Fracture of the vault:				
Bursting	4	4	100	7
Bending	108	31	29	12
Fracture of base	20	45	96	128
Gunshot of vault:				
Penetrating dura	0	3	3	17
Non-penetrating	4	0	3	0

McGlannan² takes exception to the attitude of de Schweinitz and myself as to the incidence of papilledema in head injuries and as to its value in diagnosis. That there should be any discussion upon the subject is due, so McGlannan says, to a misunderstanding "by the ophthalmologists of what the condition of the retina is in early compression." I am quite willing to accept the interpretation of the eyeground picture as given by de Schweinitz and his ophthalmic colleagues until the general surgeon can prove that he is better qualified to make more accurate observations.

Meningitis. The postmortem findings in 2 cases of purulent meningitis demonstrated the effectiveness of *subdural drainage*. In the first of Day's³ cases, the patient, a young man aged thirty years, had had suppurative otitis media since childhood. Signs of brain abscess appeared, and the dura was incised and drained, strands of silkworm gut being introduced over the posterior lobe of the cerebrum and anterior surface of the cerebellum. Upon exploration, an abscess was found on the anterior surface of the cerebellum and opened. The patient survived the operation only a few weeks, but the autopsy showed the drain still in place and no signs of exudate in that region. In the second case, a mastoidectomy was performed on a young man, aged eighteen years. Later, at a second operation, the lateral sinus was

¹Journal of Missouri State Medical Association, May, 1911.

²Maryland Medical Journal, February, 1911.

³Annals of Otology, Rhinology, and Laryngology, June, 1911.

opened and a drain inserted above and below the tentorium, but death occurred shortly afterward. The postmortem findings showed the drainage still in the wound, and the region about it clean and free from exudate. In both these cases drainage was introduced too late, but the autopsies revealed its efficacy. Day has come to the conclusion that drainage must not only be applied early in such cases, but that many drains on both sides are necessary, as one drain is effective only over a small area. (We cannot subscribe to the sweeping statement that drainage is a curative measure in suppurative meningitis. No doubt in some cases it may be helpful, but probably in the majority of cases it would have little effect except in that form of meningitis in which the process has already become walled off and confined to a limited area.)

The use of *urotropin in the treatment of meningitis* is endorsed by Ibrahim.¹ Its presence in the fluid may be proved by the bromine-water test, the formaldehyde test, or Hehner's test. He has had an opportunity to prove its efficacy in three children, to whom 0.5 grain of urotropin was given daily for two days before lumbar puncture was performed, the last dose being just an hour before the puncture. The test was positive in each case. He reports three cases which were cured by this procedure. Two of the patients were three months old, and were given a daily dose of urotropin of from 0.5 to 1.5 grains; while the third, a child, aged two and three-quarter years, was given 0.5 grain five times a day. Ibrahim recommends this form of treatment very strongly in cases of purulent meningitis and meningitis serosa, but thinks it is of little use for encephalitis and poliomyelitis.

THE MOUTH

Cheiloplasty. An ingenious operation has been proposed by Baldwin,² and I have myself used the method in one patient with a rather successful result. The removal of a cancerous growth of the lip should be done without regard either to the deformity produced, or to what steps must subsequently be taken to remedy this deformity. The essential thing is to get rid of the growth and secondarily to take care of the defect. In this operation of Baldwin's, the flap of tissue from the neck is slid upward to take the place of the chin or lip which has been removed. Transverse incisions are made an inch or two apart, depending upon the width of the flap wanted, and the tissues undermined until the ribbon-like flap is entirely free. It is then slid upward on the chin in the same manner as the strap of a helmet, and can be manipulated so that the raw surface of the flap covers the defect of the chin, and fits

¹ Med. Klinik, 1910, No. 48, p. 1893.

² Surgery, Gynecology, and Obstetrics, 1911, vol. xiv, p. 492.

snugly up against the upper lip. It is essential, however, that the skin and muscles over the point of the chin be preserved as a fixed point to support the lower lip, especially as the attachment of the levator labii inferioris will subsequently give the patient considerable control over the lower lip. In my own case, after cutting away the attachment of the flap when it had finally adhered to the chin, I was able to bring the ends together again across the front of the neck with but little resulting defect to be healed by granulation.

Vincent's Angina. This subject was reviewed in discussing a paper of Crandon, Place, and Brown in *PROGRESSIVE MEDICINE*, 1911. One of the authors¹ has written further on the subject and reports another case in detail. It seems to be apparently settled that this disease is due to certain organisms, a fusiform bacillus and a spirochete. Tunnicliff² has recently reported some interesting observations in which she noted apparently pure cultures of the fusiform bacillus develop into spirochete form. Place describes the clinical appearance as follows: "The onset of the process is often insidious, and may be first detected in a child by the foul odor of the breath. The symptoms vary from trifling to moderate fever, malaise, and sore throat. Rarely is there severe sore throat. The temperature is normal or slightly elevated, 99° to 101° F., but we have seen it as high as 102.5°. The breath is very foul, there is a bad taste in the mouth, and impaired appetite. Vomiting is usually absent. Often the subjective symptoms are very slight. At times the ulcerations are so sensitive that eating is avoided." The cervical glands are occasionally enlarged and rarely tender. Vincent and others believe that the adenitis is more constant and important. The writer considers that more than a slight adenitis is due to complicating infections.

The lesion is a shallow ulcer with sharp-cut edges, filled flush with a granular, cheesy, membranous material, whitish, yellowish, and greenish. The removal of the membrane with a curette or swab leaves a bleeding, irregular surface, and the removed material has a putrid odor.

Place believes that Vincent's angina is preventable by proper attention to the teeth, mouth, and general condition. In the fully developed cases, the following treatment is recommended: "The most satisfactory of the local applications, and one universally successful in a few days, has been swabbing with hydrogen peroxide full strength, or diluted one-half, until the ulcer is pretty clean and then painting with 2 per cent. solution of chromic acid once daily. The peroxide is used for its free oxygen and its mechanical effect in removing membrane, so that the chromic acid may reach the base of the ulcer. The combination worked much better than either alone. Cure occurred rapidly, in from two to six days, with hardly an exception."

¹ Place, *Boston Medical and Surgical Journal*, 1911, vol. clxv, p. 720.

² *Journal of Infectious Diseases*, 1911, p. 316.

Noma (Cancrum Oris) in the Adult. Noma in the aged is of unusual frequency as compared with its occurrence in children. King¹ reports a case in a woman, aged fifty-nine years, who was suffering from chronic interstitial nephritis and endocarditis. When first seen, an examination of the mouth revealed an ulcerated patch on the mucous membrane of the gum covering the outer aspect of the mandible. This ulceration rapidly increased in extent, necrosis followed, and three days later the patient died in a highly septic state. Tissue scrapings revealed *Spirocheta dentium*, great quantities of pus cocci, organisms of the leptothrix type, and fusiform bacilli. King gives a very good discussion of the literature upon noma. Poorly nourished cachectic subjects and those living in vitiated environments are said to be the type most frequently affected, but filth, squalor, and tenement life are not alone responsible for the disease as it may occur in sanitary surroundings. It also occurs very frequently as a complication of the exanthemata, erysipelas, typhoid fever, amebic dysentery, pleuritis, and nephritis. It does not differ materially in the aged from that in childhood, either as to etiology, symptomatology, or treatment. King also believes that infectious submaxillary angina may be the forerunner of noma, and once the gangrene arises it would be difficult to say whether the condition was due to Ludwig's angina or to noma.

SALVARSAN IN NOMA. Nicoll² reports an epidemic of 11 cases of noma at the Scarlet Fever Hospital, New York, with 9 deaths. He defines noma as a rapidly spreading, gangrenous process, beginning usually in the mucous membrane of the cheek, and gums, and involving all surrounding tissues, including bone, showing little tendency to self-limitation, and from which fusiform bacilli and spirochetes may be obtained in great numbers in the smears. Of the 11 cases mentioned, 4 had an antecedent attack of measles during their convalescence from scarlet fever. The 9 fatal cases were treated by the application of strong caustics, frequent cleansing of the parts, and, in some, by the removal under an anesthetic, of all the visible diseased tissues, including the bone. One case recovered after a separation of a sequestrum, and the other after the injection of salvarsan. This patient was five years of age who was admitted to the hospital with the typical symptoms of scarlet fever of a severe type. Upon admission, there was a pseudomembrane on the right tonsil. About three weeks later an ulcer developed on the inner side of the right cheek, and the following day the gums were bleeding and spongy, the ulceration having extended to them; the left cheek also developed an ulcer. Smears from the ulcers showed the fusiform Gram-negative bacilli and spirochetes. The child became emaciated and anemic, and the odor from the mouth became very offensive. He was then given 0.3 gr. salvarsan intra-

¹ Journal of the American Medical Association, 1911, vol. lvi, p. 1449.

² Archives of Pediatrics, 1911, vol. xxviii, p. 912.

venously. Three days later, the condition was apparently stationary, and the injection of salvarsan in the same dosage was repeated. Recovery then slowly but definitely occurred. It is interesting to note that after every injection of salvarsan, an intense local reaction occurred, consisting of a great increase in the swelling of the cheeks, the skin being tense, shiny, and somewhat red.

Nicoll calls attention to the fact that Rumple¹ has employed salvarsan in Vincent's angina, and that Gerber² has made use of it successfully in various forms of ulcerations about the mouth, including scurvy, which showed the typical organisms.

Cleft Palate. An interesting discussion upon this affection took place at the meeting of the Surgical Section of the British Royal Society of Medicine, in May, 1911.³

There were two main points the subject of contention:

1. *When should operation be performed?*

Arbuthnot Lane offered the introductory address and stated that he operates as soon after birth as possible, in severe cases to save life and in others to obtain sufficient air pressure in the nasopharynx during respiration to enable the nasopharyngeal surrounding bones fully to develop as they do in a normal child. "It is perfectly obvious that the more serious the case, the earlier in life it is operated on the better. The urgency varies directly with the severity of the deformity, and in severe cases, every hour which elapses between the birth of the child and the operation is of considerable importance. The earliest I have done has been within seven hours of birth. In the first few days of life these infants are at their best, and appear to show very much less evidence of shock than they do later. Besides, at this period the procedure is a very simple one, and improvement follows rapidly. Changes in the form of parts, such as the premaxilla, etc., take place with extraordinary rapidity during the first week of life as compared with the changes which ensue afterward. The effect of closure of the cleft on the general condition of the child is also most striking."

"Putting the matter as briefly as possible, early operation saves a large number of lives which would otherwise be lost. Many of the clefts present in those cases can only be closed before the gums are encroached upon by the teeth. The sooner the nose is separated from the mouth, the earlier the nasopharynx is exposed to the influence of the mechanical factors which normally determine the developments of this passage, and of the structure which surround it."

The statistics of the cases operated on by Mr. Lane were given by Barrington Ward. During the two years at the Great Ormond Street Hospital, out of 369 operations, 22 resulted fatally. Of these 369

¹ Deutsch. med. Woch., 1910, No. 49, p. 2286.

² Münch. med. Woch., 1911, No. 9, p. 452.

³ Proceedings of the Royal Society of Medicine, 1911, vol. lxii, p. 169.

operations, 144 have been first operations on infants of one year of age and under, and, of these, 124 were under six months of age; of the 144, 18 died, being a mortality of 12.5 per cent. Ward then ingeniously finds that as 10.9 per cent. is the normal death rate in infants under one year of age in England and Wales, the death rate from operation involves a mortality of 1.6 per cent. over the normal death rate. In 53 per cent. there were defects of both lip and palate; in 36 per cent. the hard palate, and in 11 per cent. the soft palate only was involved. Ward believes that a surgeon who prefers to wait some years before operating takes a very limited view of the question. The nasopharyngeal catarrh, the rhinitis, the ulceration of the septum, the Eustachian catarrh with the attendant risk of middle ear and mastoid suppuration, the increasing oral sepsis which are often present in the older cases, are a constant menace to the health if not the life of the individual. In regard to speech, Ward believes that the earlier operation permits the tongue to become accommodated to the restricted surroundings, and the development of its movements in connection with speech takes place naturally.

James Berry,¹ of London, and Johann Ulrich, of Copenhagen, were the principal opponents of Mr. Lane in this question of early operation. The former published a more complete paper later in the year, and I shall quote from that. He reported a series of 81 cases operated upon since 1905, of which 37 were complete clefts of the hard and soft palates. Two patients only were under one year of age, 5 were over sixteen. There was no mortality from the operation and, with one or two exceptions, no patient was seriously ill. He states, that it is his "strong belief, founded upon a considerable experience, not only of his own operations, but of those performed by others, that the best period in most cases for the performance of a cleft palate operation is between the ages of one and three years, according to the nature and width of the cleft, although there is a minority of cases of comparatively slight clefts, chiefly of the soft palate, in which operation may be undertaken with advantage even in the first year of life." Ulrich prefers to operate at the age of three years. He reported 56 cases, with three operative deaths, and 2 others dying later of pneumonia. C. H. Fagg stated that he had operated on 57 cases of cleft palate, of which 38 were infants under one year of age at the time of their first operation; in 17, there was an associated single harelip, and, in 10, a double harelip. Of the 38 infants, 3 died in the hospital, and 14 others died later of various causes, of which 6 were directly or indirectly due to subsequent operations for harelip.

Upon comparing these mortalities, it will be seen that Mr. Berry's position is very strong and he makes the most of it in his paper, practi-

¹ British Medical Journal, 1911, vol. ii, p. 1092.

cally taunting Mr. Lane to produce his remote mortality. He concludes that—"Mr. Lane's bold statement, wholly unsupported by statistics, that early operation saves a large number of lives which would otherwise be lost—does not receive much corroboration from the above-mentioned figures, and requires no further comment." The gist of the argument would seem to be whether the following statement of Fagg's is true, "the mortality from malnutrition among babies suffering from bad cleft palates is very high," and it was unfair to compare the results of the advocates of early operation with those of the later operators who avoid a large percentage of these. Burghard, Berry, and Kellock denied its truth.

2. *What technique should be employed?*

Lane uses almost invariably the flap operation which bears his name. In defending it he simply stated that "those who had been in the habit of doing the old operation would continue to do it, while he believed that the younger men were taking up the new operation." Ward remarks that the question of tension never enters into the flap operation, the method being merely an extension of the general surgical principle of overlapping. Berry performs the operation of Langenbeck (Fergusson, Smith), or some slight modifications of it, in all cases. He does not approve of the flap method, but has never performed it. He emphasizes the importance of detaching the soft palate from the posterior edge of the hard palate and the necessity for patience and gentleness in the performance of the operation. Ward mentions the necessity of relieving tension by lateral incisions dividing the levator palati, and refers to the operation as a paring and suturing method; Berry, however, uses a wide tension stitch in place of the incision, and states that a fact ignored by the "turn-over flap" advocates is that an essential feature of the Langenbeck operation in most cases is not mere paring of the edges and median suture, but also the formation of a flap of mucoperiosteal tissues from the hard palate. Berry also emphasizes the importance of the soft palate, and states that of 80 cases in which the soft palate was cleft, he obtained primary union 76 times after the first operation. In 44 of the 81 cases, complete union was obtained after the first operation, and, in 12 others, complete union was obtained after one or more supplementary operations, mostly for small holes in the hard palate. The remainder (25) almost entirely represent those left with small holes not yet completely closed and a few which cannot be traced.

As to the Brophy operation, the general opinion was distinctly adverse. Ulrich's position is as follows: "In the worst cases I operate if necessary on the processus alveolaris by the unilateral method with a Duplay's operation, by the double method after Bardeleben, and prefer to operate as early as possible. I operate subsequently for hare-lip at the age of from four to six months. The cleft in the palate

will then, as a rule, gradually diminish; but if it is still very broad at the age of from two to three years, I abandon the patient to the prothesis treatment.

"I think there are cases in which careful pressure of the jaws in the newborn child will make operation easier later. In the other cases in which the cleft is narrower, I operate on the processus also as soon as possible; on the harelip at the age of from four to six months, and for the cleft palate I prefer Langenbeck's operation at the age of about two or three years with a preference for the later age."

SPEECH DEFECTS AFTER OPERATION. Waugh opened up the question whether surgery was really able to modify the speech of the sufferer from the deformity. "The evidence that the cleft in the palate was responsible for the speech defect was very largely an accepted tradition, but had not been subject to criticism. Surgeons saw all varieties and grades of defect of speech which might be associated with slight palate defects, but might also be associated with gross palate defects; there was no proportion between the two. Neither were the after-results to be correlated with the extent of the deformity. There might be left behind a residuum of grave speech defect after a most successful operation, and in spite of the most careful training. In other cases there might be left after operation a not very mobile soft palate, and yet the patient could speak comparatively well. There was also the type of case to be explained, in which, without defect of either structure or function in the hard or soft palate, the child spoke as if it had no roof to its mouth, and no mobile palate. That provided one with the key to the discrepancies of speech which followed not only on the operative results achieved by closing the palate, but also from the variations in the degree of speech defect associated with the different deformities.

"While it has been assumed hastily that the cause of the speech defect was residual in the structural alteration of the palate, in all probability there were two associated lesions to consider—one in the function of the speech centres, and one in the structure of the palate—and they were not two interdependent lesions. Therefore, it ought not to go forth as the opinion of that meeting that surgical operations on cleft palate could hold out much hope to the victims of that condition that they would be able to disguise their deformity in after-life. Among the cases shown that day, with the exception of Mr. Berry's solitary brilliant case, he could not find a patient who was not very obviously a palate sufferer. The problem of dealing with cleft palate becomes, possibly, an eugenic one. He had reviewed the notes of 80 cases, and it was surprising in how many there was history of cleft palate in the family, on one side or on both. If it were assumed, as a result of a consensus of opinion, that surgery would enable a cleft palate sufferer to cover his deficiency of speech and allow him to enter any profession,

it would be wrong. Seeing that it tended to become a familial defect, it should be a warning that the stock was not one likely to result, if perpetuated, in happiness for the individual who had to bear the brunt of that lesion. That was particularly hard upon some of the patients, as many of them were highly developed intellectually. Nearly all the patients suffering from this defect which he had seen were above the standard for their age at school, and were noted for their facility and aptness in learning. Hence their disappointment at being handicapped would be all the keener. He thought surgeons should contradict a wrong impression as to the benefits which surgery could confer and should claim only that patients could be enabled to breathe through the normal passages, and allow swallowing to be carried on in a fairly normal manner, as a result of surgical interference with the deformity."

FLAP FROM NECK FOR CLEFT PALATE. Blair¹ describes a method of utilizing a flap from the side of the neck and upper part of the chest for repairing the defect in the hard palate. A flap two inches wide was dissected up, and included the skin, superficial fascia, and platysmal muscle. An incision was made in the bottom of the buccal alveolar cul-de-sac on that side and the flap drawn into the mouth and stitched into the defect, the palate edges having been freshened. The defect in the neck was immediately repaired by undermining the superficial tissues of the neck and suturing. Ten days later the pedicle of the flap was cut and the upper end of the neck defect repaired. He has operated by this method a number of times and states that no inconvenience has been observed as a result of transplanting the skin into the mouth. It soon takes on the appearance closely resembling normal mucous membrane.

Oral Carcinoma. Cancer investigation and research at the present time is mostly confined to an attempt to prove the parasitic theory or to disprove it, to produce tumor growth in animals, or to work along chemical lines. It is interesting, and refreshing, therefore, to turn back once more to more traditional lines of research conducted along clinical lines. Singer² offers a most interesting study of the general physical and diathetic states of carcinomatous patients based on 700 cases. Especial attention is directed to carcinoma arising in the mucous membrane of the oral cavity, but other forms of cancer are used for purposes of comparison and control. He depicts some very interesting curves, and enunciates the following tentative conclusions:

"1. It is thought that carcinoma beginning in the oral mucous membrane may form a separate clinical entity, in which carcinoma of the esophagus should perhaps be included, but from which epithelioma of the lip should probably be excluded.

¹ Surgery, Gynecology, and Obstetrics, 1911, vol. xii, p. 289.

² Quarterly Journal of Medicine, 1911, vol. v, p. 15.

"2. The cases forming the oral group of cancer do not, as a class, form an average of the general population. They appear to differ from the general population in the following particulars: (a) There is an overwhelming preponderance of males over females among them. (b) A large percentage have suffered from syphilis, often of very severe type. (c) Many are stout, heavy, plethoric men, of the type well illustrated in actual life by our police and soldiers. They are most often men of exceptionally robust previous health. These facts are emphasized by their social position and occupations. (d) That their metabolism is probably not that of the normal population is suggested by the fact that a considerable percentage of them have suffered more or less severely with gout, usually of a typical and easily recognizable form. (e) Although apparently healthy, except as regards the local disease and the effects of syphilis and gout, these patients exhibit evidence of renal interstitial change and arterial degeneration. It is true that vascular and renal degenerative changes are apt to declare themselves at a period of life when carcinoma of the mouth is most common. Yet even allowing for this, and allowing for syphilis and gout as antecedent conditions, there still appears to be a further unexplained predominance of vascular and renal change among cases of oral cancer.

"3. The liability to oral carcinoma at various ages differs from that of cancer of other regions in a special manner; this difference may be graphically expressed in death-rate curves which are characteristic of this malady and are typified by the curves for cancer of the tongue.

"It is suggested that these peculiarities may be in part explained by assuming that the earlier cases are more frequently of syphilitic origin, while the later have other associations, among which gout is to be reckoned.

"4. Aneurysm and certain vascular diseases present certain analogies to some types of oral carcinoma, especially as regards age distribution, and it seems not unlikely that these analogies may be related to similar etiological factors."

Congenital Epulides (Odontoblastomata). This is among the rarest of tumors, and a case is reported by Kaempfer,¹ together with a review of the previously reported cases, 8 in number. This tumor is of the connective-tissue type, and originates in the papilla of the developing teeth. Clinically, the tumors are usually small and pedunculated, and attached at the side of the incisor teeth. They interfere with closing, and after removal do not recur. In one of the reported cases, subsequent dentition was interfered with, evidenced by a mal-development of the teeth at the site of the previous tumor. He believes that as the cells are derived from the papilla, the term odontoblastomata should be adopted, the epithelial inclusions being incidental and subordinate.

¹ Surgery, Gynecology, and Obstetrics, 1911, vol. xii, p. 357.

Nasopharyngeal Tumors. The nasal and nasopharyngeal regions are frequently the seat of tumors, most of them being benign in character, and constituting the familiar adenoids seen in children or the fibromata and polyps of adults. Sarcoma and carcinoma are also met with and are removed with difficulty, mostly because of the inaccessible nature of the tumor and the tendency to hemorrhage. The early symptoms manifested by tumors of the vomer are nasal obstruction, and consequent changes in the voice, and, later, offensive discharges. The septum will be found to be abnormally thickened, and the condition may be mistaken for abscess. C. H. Mayo¹ operated upon 2 cases of malignant disease of the vomer, each with a pear-shaped enlargement of the septum which completely closed the posterior nares. The operation was performed as follows: The central posterior half of the hard palate was resected, a section of bone one inch long and three-quarters of an inch wide being removed; the mucoperiosteum and soft tissues were preserved. In neither case was it necessary to sever the soft palate. After opening the roof of the mouth, the septum was rapidly removed with bone-cutting scissors and curetted, and the space packed with gauze. The hemorrhage was quite free during the operation, and required constant sponging or a sucking apparatus for its removal. The area of superior attachment of the vomer was then cauterized with a Paquelin and the nasal space packed with benzoated gauze. Mayo believes that in performing this operation some cases may be treated by immediate suture of the mucoperiosteum, while in others it may seem best to maintain the opening for a time, at least for observation and treatment.

In the discussion on this paper, Dr. Albert E. Halstead, of Chicago, said that he had operated in a number of these cases. The first method he tried was the temporary resection of the alveolar processes of the superior maxilla dropping down near the hard palate. That operation gave an excellent field to work through, but caused a great deal of deformity, and the after results were not satisfactory, it being difficult to replace and keep the bone in place. The second method was the one he later adopted for the removal of the hypophysis, known as the Loewe method; an incision was made underneath the lip and the lip turned up toward the top of the head. This method also gave an excellent view of the tumor, and made it extremely easy to work in the nasopharynx. The third time he tried a method of splitting the palate and removing the tumor through the mouth. The difficulty with this method was that there was a necrosis of the hard palate and could never afterward close the opening completely. Therefore, from his experience, he would strongly advocate the method of Loewe for the removal of tumors of the vomer.

¹ *Annals of Surgery*, 1911, vol. liv, p. 302.

Krogius¹ prefers to expose the nasopharynx by median division of the lower jaw and separation of the soft from the hard palate; the latter point is essential as affording better access to the lower part of the sphenoid and the nasopharynx. He describes 2 cases successfully operated upon by this method, one a sarcoma in the nasopharynx and the other a sarcoma of the sphenomaxillary fossa.

THE FACE

Mixed Tumors of the Parotid Gland. Judd² reports upon 41 cases in which operation was performed in the clinic at St. Mary's Hospital. The tumors occurred in patients from fifteen to seventy-one years of age and the duration of growth averaged eight years.

In 9 of these cases the endothelial element predominated, 5 were sarcomatous, 3 were mixed-cell tumors undergoing sarcomatous change, and 3 were mixed tumors undergoing endotheliomatous change. Ten of these patients came with recurring growths, or they had recurrences following operation.

Twenty-seven of the 41 patients have recently been heard from, 24 of them state that they are perfectly well, and 3 of them say they have a local recurrence. Two of the 3 had predominating sarcomatous element at the time of operation; 1, a man aged seventy years, had had a tumor for thirty years, with a history of rapid growth during the last three months. This patient died, evidently of metastasis.

"The endeavor to preserve all of the fibers of the seventh nerve may be said to be the cause of most of the recurrences following the removal of mixed tumors of the parotid gland. If we could deliberately excise the tumor with as much of the parotid as we deemed wise, there would be no recurrences in the early cases, but, as long as these tumors are not severely malignant in the beginning, it is a question whether we are justified in sacrificing the facial nerve.

"In the encapsulated cases it has been our custom to completely excise the tumor with the capsule and to pack the entire wound with gauze saturated with a caustic (Harrington's solution), in order that the raw surfaces may be seared to prevent the grafting of any cells. We have not found it necessary to remove any of the lymphatics if the growth is well encapsulated, and we have not observed that these tumors involved the lymphatics until very late in their development. On the other hand, if the disease is extending into the parotid and into the surrounding lymphatics, we have excised the parotid entirely, and with it the adjoining lymphatics. In these cases we disregard the facial nerve. In a few of our cases the tumor was very large, pressing

¹ *Zentralbl. f. Chir.*, 1911, No. 12.

² *Journal of the Minnesota State Medical Association*, 1911, vol. xxxi, p. 287.

into the mouth and throat, and causing considerable dysphagia and interference in swallowing. In these cases, in addition to the removal of the parotid gland, it was necessary to sacrifice the external artery and the internal jugular vein."

I believe the important factors in the treatment of these cases are, to get the case early while the tumor is still encapsulated, and at that time to remove the growth thoroughly with all of its capsule.

Fractures of the Nose. Roberts¹ discusses the subject in a very complete manner, and illustrates his paper with excellent illustrations. He discusses the various anatomical relations of the bones and cartilages comprising the nose in both the normal condition and after fracture or dislocation. The character of the injury and the form of displacement are to be determined by palpation of the exterior with the fingers, assisted by a rigid cylindrical instrument within the nose for counter-pressure. It is well to remember that fractures of the septum occur most frequently in the posterior two-thirds of the quadrangular cartilage or the anterior half of the bony septum. When displacement has been found, readjustment of the fragments or of the luxated structures must be promptly effected; saddle nose, bent nose, twisted nose, and occlusions more or less complete on one or both sides are frequent witnesses of unrecognized or untreated nasal injuries. Fractures are firmly united in from two to three weeks with but little callus. After correction of the deformity, the position may be maintained by nasal bands, internal splints, and external pads attached to the forehead. There is, as a rule, but little tendency for the replaced fragments of the bones of the nasal bridge to drop inward, or be displaced in other directions, and this may be prevented by a small strip of gauze packing, filling the intranasal spaces directly under the bony bridge on the required side of the septum, or a steel pin or drill may be thrust transversely through the nose under the bony bridge, and if further support is demanded to keep the arch of the two nasal bones established, a piece of cork or a flat leaden shot may be clamped on the point of the pin. The skin should be protected with a piece of rubber under the shot or the head of the pin. Two or three days are long enough to leave the pin in position.

Another method is to carry a rubber thread through drilled holes and hold it by shot clamped on the nose. This method will give lateral pressure and permit swelling or shrinking of the soft tissues without injury to the skin or disturbing too much the desired lateral pressure.

Old, unreduced fractures and dislocations require osteotomy or refracture and re-adjustment. Much may be done by dividing cartilage and bone from within the nose. The operator punctures the mucous

¹ Surgery, Gynecology, and Obstetrics, 1911, vol. xii, p. 579.

membrane in the necessary places and, by thrusting small saws or chisels under it, reaches the bone or cartilage to be divided. The overlapping soft parts may be detached by a tenotome. After the bones have been divided and the readjustment completed, fine linen and silk sutures restore the cutaneous surface. He corrects saddle nose by paraffin injection, and prefers Mosher's method in old, uncomplicated lateral deviation of the bony bridge; in this, the nasal bone is cut from the ascending process of the maxilla and from the frontal bone on both sides of the nose, complete, so that the bony nasal bridge is freely movable. It can thus be returned to the normal position in the median line and held there by some form of external splint. It may also be necessary to remove a portion of the cartilage in case this is knuckled.

Rhinoplasty. McGraw¹ discusses the use of the finger to supply the bony support necessary to prevent the collapse of the nasal soft parts. I abstract his paper because he collects, including his own, the 12 cases in which this was done. He believes that a study of these cases shows that progress in this line of surgery will depend upon the development of its technique, each surgeon who has hitherto used the method having been obliged to follow a form of his own devising. Accordingly, he formulates the following:

No plastic operations of this kind should be undertaken until ulceration has ceased, necrosed bones have been removed, and the surfaces have thoroughly healed, nor should patients be operated on who have advanced arterial degeneration, or serious constitutional maladies. If other operations are indicated for the repair of minor defects, they should, when possible, be done before the transplanting of the finger. This is more especially the case with defects which require the use of skin flaps from the neighborhood of the mouth. The question as to which finger should be selected for transplantation should be carefully considered in every case, and, as a rule, the little finger of the left hand is the best to choose. Great care should be taken, in preparing the patient for an operation, to have the head, neck, and body thoroughly cleansed, and on the day before the operation there should be applied a plaster-of-Paris bandage, which will render the head absolutely immobile. The finger should be prepared a week or two before the operation by removing the nail and destroying its matrix with acids, or, as McGraw prefers, by removal with the chisel or sharp bone spoon at the time of operation. The bridge between the finger graft and hand should be composed of soft and pliable tissues, (1) because any sudden jar or movement would be much more apt to disturb the wounds and prevent union if the connection were rigid and bony than if it were composed of the soft parts only; and (2) the final separation

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 557.

of the finger from the hand is much more easily effected if there is no bone to divide or joint to excise. In all cases the incision should be made in the median line to avoid injury to the digital arteries. The finger should not be amputated from the nose until the surgeon has satisfied himself that the new nose is well supplied with blood from other sources than the digital arteries. He urges great care in fitting the terminal phalanx into the nasal processes, the more closely the two bones are approximated, the more chance there will be of bony union, and the more permanent will be the position of the newly repaired organ.

Rhinophyma. OPERATIVE TREATMENT. Fowler¹ describes the following operation for those extreme forms of acne rosacea with nodular masses: "The method consists in the removal of the nodules and the deeper thickened layer of skin in such a way as to restore the original shape of the nose and leave sufficient thin skin flaps to cover the resulting raw surfaces. It is best to attack the nodules first, incising each nodule about one-quarter way up its circumference or at a sufficient distance from its base to insure enough skin to cover in the resulting defect. A very sharp, narrow, thin-bladed knife is required. The entire thickness of the skin should not be saved, as all the layers of the skin partake in the process; only the superficial layers should be saved. Each nodule is removed in its entirety except for the thin layer of skin at the base. Following their removal the thickened skin of the remainder of the *alæ nasi* and of the rest of the nose, if involved, is incised by means of incisions parallel to the long axis of the nose in the case of all the skin except the *alæ nasi*.

"The incisions should be about one-quarter of an inch distant from each other. The deeper portion of each strip thus formed is excised, leaving a very thin superficial layer. Care should be taken not to destroy the attachment at either end of the strip. The incision to remove the thickened portion from the *alæ nasi* should be in the normal line just above this portion of the nose, but should not encroach too much toward the cheek. The flap is turned down and out toward the cheek and all the thickened tissue removed, leaving only the superficial layers of the skin. Up to this point no trimming of the flaps has been done. All bleeding has been controlled, preferably by pressure. An assistant attends to this while the operator works upon another part of the nose, so that when the excision is complete the field is dry. The flaps are now adjusted and any excess at the edges removed with small sharp manicure scissors. Accurate fitting together of these flaps is essential to a final good result. It will try one's ingenuity at times to secure accurate apposition. The dressing consists of a soft pad of gauze fitted to the nose and secured by adhesive plaster. The dressing should not obstruct the nostrils."

¹ American Journal of Surgery, 1911, vol. xxv, p. 258.

THE JAW

Temporomaxillary Ankylosis. There have been a number of operations devised for the relief of this affection, all of which are more or less difficult of execution, and attended by considerable danger of permanent injury to the branches of the facial nerve. Lilienthal¹ has devised a new method rather easy of execution, with an insignificant cicatrix, and with but little danger of injuring the facial nerve. The operation was performed as follows: An incision down to the periosteum was made along the zygoma from just in front of the auricle; then, from the beginning of this incision at a point nearest the ear, a second incision was carried through the skin alone, vertically downward for one and one-half inches toward the angle of the jaw. The triangular flap thus made was dissected off and turned downward and forward. By means of a Gigli saw, the anterior and posterior portions of the zygoma were divided and the loosened section of this point drawn downward, together with the attached masseter muscle and other soft parts, including a part of the parotid gland and fibers of the facial nerve. The joint is thus exposed perfectly. With a narrow gouge and curette the remains of the distorted condyle and neck were taken away. The osteoplastic flap of the zygoma is then replaced, the normal traction of the masseter muscle holding it firmly in place without wire or other mechanical device. The skin flap was then sutured and the operation concluded. Nine days later the same operation was performed on the other side, and functional recovery was subsequently so perfect that within two or three weeks the patient was able to eat a raw apple, separating the teeth widely and biting into it in a perfectly normal manner.

Phosphorus Necrosis of the Jaw. Ivy² observed, during an experience of two and one-half years of supervision of the hygiene of employees in a large match factory, several cases of necrosis of the jaw. Whether the result is an expression of the general toxemia sometimes present in these cases, the poison derived from the blood after absorption into the system, or whether it gains direct entrance through local lesions in the mouth is still unsettled. He believes that the disease, as a general rule, may be purely local in origin, the poison gaining entrance through local points of lowered resistance in the mouth, such as decay of the teeth involving the root canals, pyorrhea alveolaris, etc. It is well established that the white or yellow phosphorus alone is poisonous, and in many European countries, including Great Britain, the use of this form of phosphorus is forbidden in the manufacture of matches, but it is commonly used by the American manu-

¹ *Annals of Surgery*, 1911, vol. liv, p. 145.

² *Journal of the American Medical Association*, 1911, vol. lvi, p. 1018.

facturers in making the common yellow phosphorus parlor match. There is an attempt being made at the present time to eliminate this highly dangerous form of phosphorus and the substitution of non-poisonous, red, amorphous phosphorus and the sesquisulphid form of phosphorus, but the enormous capitalization of the match companies of the United States and the influence which such represents is opposing any movement for reform.

Ivy, however, believes that the substitution of other forms of phosphorus for the white phosphorus is unnecessary if proper precautions be taken. There were 7 cases of true phosphorus necrosis with 1 fatality occurring in the particular factory inspected by Ivy, all occurring in persons who had worked at the trade for several years before the routine examinations were begun. Four of these were in the upper jaw and 3 in the lower, a point contrary to the general teaching. The disease has developed in no one who has, since admission to the factory, been subjected to a monthly examination of the mouth and teeth.

Elastic Bandage in Fracture of the Jaw. It is often difficult to apply a splint in multiple fracture of the jaw, marked compound cases with separation of the alveolar process, or cases with marked swelling and hematoma, because of the pain induced by the intrabuccal appliance. Landry¹ calls attention to the practicability, after reducing the fracture, of holding the fragments by means of a thin Esmarch elastic bandage, applied somewhat in the manner of a Barton dressing. This method of treatment was advocated many years ago by French surgeons and deserves wider use.

THE NECK

Suppurative Lymphadenitis in Infancy. In an interesting paper by Southworth,² the surgical management of acute abscess of the lymph nodes is discussed. After mentioning the steps in the morbid process, he draws the following conclusions: "(1) That in the common, acute type of glandular suppuration in infancy and early childhood, suppuration is not diffuse, but more or less limited by the line of the distended capsule of the gland. (2) That the infection having been rounded up and brought under control by the sacrifice of the parenchyma of the gland, nature seeks as speedily as possible to evacuate the pus and detritus. (3) That our purpose, therefore, in incising such abscesses is not to check a destructive process by heroic measures, but to give just the requisite amount of aid to complete a conservative process. (4) That when this is accomplished, restitution of the surrounding tissues proceeds with the greatest rapidity."

As a corollary to these conclusions, he discusses the size of the

¹ New Orleans Medical and Surgical Journal, January, 1911.

² Archives of Pediatrics, 1911, vol. xxviii, p. 767.

necessary incision and the nature of the drainage to be employed. The smallest incision which will allow of gentle expression of pus, and the smallest tube drainage which will permit the continuous escape of the subsequent seropurulent discharge from the cavity are all that is ever required. The following plan is the one which his considerable experience has led him to adopt:

"As soon as the gland has softened so as to give distinct fluctuation, a site for the incision is sought where the overlying tissues are thinnest, preferably near the lower border of the mass, and, if possible, in one of the natural folds of the skin, which may show as fine lines upon the surface. An incision not exceeding five-sixteenths of an inch, and often shorter, is then made with a narrow, straight bistoury through the skin and subcutaneous tissue, and if pus is not immediately reached, further dissection and penetration is accomplished with a grooved director, until pus flows. Gentle pressure, with occasional introduction of the director to dislodge flocculi, is continued until the evacuation is complete.

"The smallest drainage-tube obtainable, not exceeding three-sixteenths of an inch in diameter, is fenestrated, slipped over a probe, and introduced to the bottom of the cavity. A bit of small catheter, from which a small segment has been cut longitudinally, in lieu of fenestration, serves well. A corkscrew motion often facilitates the introduction of either form of drain. If the incision proves rather small, it may be stretched with dressing forceps or artery clamp, but not enlarged by cutting. The usual safety pin of small size guards the drain, and a dry or moist dressing is applied.

"This dressing is changed on the second day thereafter (forty-eight hours). Already the walls of the abscess cavity have contracted, and there are evidences that granulations have grown into the fenestræ of the tube. As a rule, only a little milky pus from the granulations can be expressed from the tract. In abscesses lying near the surface, the tube may often be removed entirely at this dressing, sufficient drainage being provided for by the temporary fistulous tract formed by the tube. In instances in which the tube is found displaced by movement of the dressing, it is not necessary to replace it if the introduction of a sterile probe or director does not reveal retained pus. If, however, the abscess is one of a deep gland, and fascia has been penetrated to reach it, it is wiser to reintroduce the cleansed and shortened tube, to prevent retention by the narrow opening in the fascia.

"At the second dressing on the fourth day, the tube may usually be dispensed with, and a dressing of ichthyol ointment—10 to 20 per cent.—applied and employed for subsequent dressings until cicatrization is completed. This is not only more comfortable for the infant than the usual dry or moist dressing, which soon adheres to the wound, but while favoring drainage, also exerts its characteristic influence

upon surrounding induration of tissues of neighboring glands. Complete closure with a minimal scar is found by the seventh day."

Hyperplastic Cervical Nodes. An investigation conducted by Osborne¹ is of interest in supplying some statistical evidence as to the relation existing between enlarged lymphatic nodes in the neck on the one hand, and carious teeth, enlarged tonsils, and adenoids on the other hand; 2474 children were examined, and the results are embodied in the following table:

SHOWING CORRELATION OF NODES WITH TEETH, TONSILS, AND ADENOIDS.

Teeth.	Tonsils.	Adenoids.
A. No caries.	A. No enlargement.	A. No adenoids.
B. One to four carious.	B. Moderate enlargement.	B. Moderate adenoids.
C. Above four carious.	C. Marked enlargement.	C. Marked enlargement.

Glands.	Number exam.	Teeth.			Tonsils.			Adenoids.		
		A %	B %	C %	A %	B %	C %	A %	B %	C %
Not exceeding size of lentil	158	11.8	6.1	3.0	7.3	1.1	1.4	6.9	0.5	0.0
Up to size of haricot bean	1727	65.2	72.8	64.2	72.9	55.1	34.2	73.1	34.8	23.8
Beyond size of haricot bean	589	23.0	21.1	32.8	19.8	43.8	64.4	20.0	64.7	76.2
Total	2474	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Woody Phlegmon of the Neck (Reclus). This affection was first described in 1893 by Paul Reclus, and while, as a matter of fact, it amounts to nothing more than a chronic cellulitis, it has often attained the dignity of a separate clinical entity. Powers² reports three personal observations and brings the literature up to date. He also gives an abstract of a letter from Reclus under date of February 8, 1911, in which it is stated that the condition is not to be considered a definite morbid entity, but that it is a form of anatomical reaction which can be provoked by any pathogenic germ; not only by the ordinary agents of suppuration, but also by the fungi, etc. Woody phlegmon of the neck, according to Powers, is generally seen in men depreciated in general health, and over forty-five years of age. The portal of entry is probably the tissues of the mouth, the pharynx, or the salivary glands.

The condition is essentially a chronic one, simulating carcinoma, sarcoma, or actinomycosis. The general tendency of the disease is

¹ British Medical Journal, 1911, vol. i, p. 70.

² Journal of the American Medical Association, vol. Ivii, p. 365.

toward recovery, although fatalities may occur through edema of the larynx, pressure, diffuse extension, and exhaustion.

The *treatment* is that of any slowly progressing suppurative process. Foci of softening should be induced by warm, moist compresses. Free incisions may be made. Excisions of wide areas of board-like tissues should be practised in suitable cases. The general health should be brought up to the highest possible point. As autogenous vaccines may prove to be of value, a careful bacteriological study of each case is necessary. The surgeon should be in readiness at all times to perform any required intubation of the larynx or tracheotomy.

Powers remarks finally that "while the communication concerns woody phlegmon of the neck, it is to be remembered that a similar pathological process may affect other portions of the body." By this he means that in other regions infection may be followed by an anatomical reaction characterized essentially by the production of fibrous tissue. The so-called perinephritic sclerosis is practically a ligneous phlegmon. In the Philadelphia Hospital, I have often seen cases of cellulitis of the extremities in which the constitutional symptoms were of but little moment, while the extremities were extensively edematous, hard, and ultimately necrotic.

It is to be regretted that surgeons will persist in making a number of clinical entities out of one morbid process. If the process of infection were better understood and the reaction of the tissues better known, there would be no necessity for elaborate papers upon Ludwig's angina, ligneous phlegmon; Potts' puffy tumor, etc., which now burden the literature.

Hodgkin's Disease. Except for the monographs of Reed and of Longcope and the papers by Coley, there has been nothing worth while in the literature about this affection for a long time. Ziegler,¹ of Breslau, has recently written a comprehensive work upon Hodgkin's disease and gives the following lucid definition: "A specific inflammatory disease, for the most part chronic, which almost always attacks the lymphatic system first, leading to a progressive and finally almost universal swelling of its constitutional parts. Secondarily, it involves the most various organs, and is accompanied by anemia, cachexia, fever, and peculiar phenomena in the skin and mucous membranes." His book is beautifully illustrated and gives over 700 references. Unfortunately, he is able to offer nothing new in the way of treatment. Arsenic is the least unsatisfactory drug to use, and salvarsan has proved disappointing. Surgery seems of no avail, but the x-rays may produce temporary improvement.

Symmers² contributes a very interesting study of 2 cases of Hodgkin's disease in which the clinical signs were suggestive, but in which the

¹ Die Hodkinische Krankheit, Jena, 1911.

² New York Medical Journal, 1911, p. 971.

stroma of the involved lymph nodes had undergone such extensive hyaline transformation that the histological diagnosis was established with difficulty. In another case, the patient presented the classical, anatomical changes of status lymphaticus, and definite tubercles were detected in the microscopic preparation in a number of the lymph nodes removed from the neck, thorax, and abdomen. Symmers' paper is of interest to the surgeon; (1) because of the difficulty in diagnosing Hodgkin's disease from malignant neoplasms, and (2) because of the fact that Hodgkin's disease itself is capable of transformation into a malignant neoplasm. In regard to the latter statement, Symmers believes that "a type of Hodgkin's disease exists, either primarily in the cervical region, or in the thorax, in which the growth may invade surrounding structures and initiate secondary nodules in distant parts. In either issue, the process admits of at least two legitimate interpretations: (1) That invasion of surrounding viscera may be referred to sarcomatous transformation of an ordinarily granulomatous lesion, or that it is an expression of compulsory growth and thus locally malignant rather than malignant in the sense that the infiltrating cells possess autonomous properties. (2) That the occurrence of secondary nodules may signify neoplastic conversion of the original growth and the transmission of autonomous qualities to cellular emboli deposited in distant parts, or that the transplanted provocative agent finds a suitable field of activity in the form of lymphomatous foci preëxisting in the organ secondarily involved, or that it actually brings such foci into being, the process throughout remaining within the bounds of an inflammatory lesion.

"But when such highly presumptive evidence of malignancy as destructive infiltration of neighboring tissues and the formation of secondary nodules in distant parts is combined with changes in the morphology of the growth, indicated by the development of vast numbers of large round cells and of myeloid giant cells, neoplastic conversion would appear to be established beyond doubt."

THE THYROID GLAND

Lingual, Sublingual, and Other Aberrant Thyroids. The anomalies of the thyroid glands are of unusual interest, embryologically and clinically, but they are generally well known and easily understood. It is of interest, however, to report the experience of so prominent an operator as C. H. Mayo,¹ who has seen but three lingual thyroids—one in a youth, aged eighteen years, in whom the growth had been present for six years; one in a woman, aged forty-six years, which had been

¹ Journal of the American Medical Association, 1911, vol. lvii, p. 784.

noticed for several years; and one in a woman, aged sixty-three years, which had been present about two years. The latter case presents both types of lingual and sublingual; the superior upper portion was the size of a large walnut, while the inferior lingual tumor was nearly as large.

"The thyroids in the tongue are usually rounded tumors covered with thin mucosae, with numerous veins crossing over the surface. Their prominence is between the epiglottis and foramen cecum. The slowness of the growth, in consideration of the richness of the blood supply in this area, usually eliminates malignancy. Angiomas are differentiated by being more spongy, more irregular in outline, of purple color, and usually showing venous extension to one of the lateral pharyngeal areas.

"When tumors are found in the lingual and the sublingual positions in the same patient they may be removed, if preferred, in two stages: first, from a hyoid transverse incision with separation of the muscles, similar to ordinary goitre operations (this operation leaves less scar than the vertical); later, enucleation of the upper portion from the tongue, as was done in the third case.

"In the enucleation of lingual thyroids, the tongue and pharyngeal areas are cocainized, the patient anesthetized with ether, and a rapid operation made while the tongue is held in extreme tension. The free hemorrhage is controlled by deep sutures. In very extensive superior lingual goitre, it may be advisable occasionally to ligate the lingual arteries and make a laryngotomy as a preliminary procedure. It will rarely be necessary to divide and separate the lower jaw.

"While the operations for the removal of lingual thyroids through the mouth have been quite bloody, they have been successful; practically no fatalities have been reported. Although there have been approximately but 50 cases recorded, undoubtedly there have been many others in which patients have been operated on."

Smyth¹ reports the cases recorded in the literature, to which he adds 6 others, 3 his own. There are 67 in all, but despite this small number he believes that the affection is much more common than is generally supposed, many persons being unaware of their existence on account of the lack of symptoms; 61 of the cases were in females, and the symptoms are caused by the size and the rapidity of the growth of the tumor. The great bulk occur in persons between the ages of fifteen and forty-five. Smyth notes that care should be taken to ascertain the presence of some other source of thyroid secretion before removing radically.

Acute Thyroiditis. Robertson² reports 3 cases and collects 93 from the literature. It occurs most frequently between the ages of twenty

¹ *Annals of Otology, Rhinology, and Laryngology*, 1911, vol. xx, p. 367.

² *Lancet*, 1911, vol. i, p. 930.

and forty. But little is known of the etiology. Trauma, circulatory congestion, and exposure to cold have been looked on as predisposing conditions. Of Robertson's series, 35 occurred in glands already goitrous, 7 in the course of acute rheumatism, 6 of acute pneumonia, 6 of acute enteric fever, 4 of acute erysipelas, 4 of influenza, 4 of malaria, 4 of diphtheria, 3 of tonsillitis, and 3 during the puerperium. About 40 per cent. of the cases go on to suppuration, all the pneumonia and puerperal cases and a large majority of the typhoid, diphtheria and erysipelas cases.

The symptoms vary accordingly as the inflammation of the gland is a primary affection or arises in the course of some preëxisting disease. In the former case there are initial chills, malaise and headache common to all febrile infections. Pain is felt in the region of the gland, usually in one lobe, often radiating to the ear and side of the neck, lancinating in character, especially aggravated by extension of the head. As a result, the attitude may be somewhat characteristic—the head bowed, and the chin supported on the hand. Local swelling usually appears in a day or two, and, as a mechanical result, dyspnea may be marked and some degree of dysphagia may be complained of. The voice may be affected; even absolute aphonia has been described, and an irritative cough with slightly blood-stained expectoration or a true hemoptysis may be present. When suppuration occurs, the usual signs of the presence of pus appear. If untreated, the abscess may perforate the trachea or esophagus, or burrow into the mediastinum.

The diagnosis must be made from simple parenchymatous goitre, from adenitis and cellulitis of neighboring parts, from sudden hemorrhage into the thyroid and from malignant disease. Of the 96 cases, 12 died; 2 of the 54 simple cases; 9 of the 41 suppurative; and the only case of gangrene.

The treatment is along the usual lines; rest and local applications for the simple cases; incisions for suppuration, and tracheotomy if the dyspnea threatens suffocation.

Woody Thyroiditis. Delore and Almartine¹ report a case of transformation of the thyroid glands in a hard mass causing serious symptoms from compression. They describe the condition as chronic ligneous strumitis; but it amounts to nothing more than a resolving inflammation with marked reaction. It may, of course, be confused with carcinoma, but the writers believe that it may be diagnosticated when the thyroid swells rapidly, becomes extremely hard, and early interferes with respiration. The patients are usually between thirty and forty years. They advocate x-ray treatment when there is no functional disturbance, and the resection of a wedge from the isthmus when dyspnea is threatened.

¹ Rev. de Chir., 1911, vol. xxxi, p. 1.

Intrathoracic Cyst of the Thyroid Gland. Martin¹ reports a case of large intrathoracic cyst causing dyspnea in a man, aged twenty-one years. He suffered for two years from cough, headache, and dyspnea, was very susceptible to attacks of bronchitis, and was very short of breath upon exertion. His neck gradually increased in size and, upon coughing, a swelling was raised above the right clavicle which disappeared upon cessation of coughing. Later, the swelling protruded above the middle of the right clavicle, extending across the middle line, and filled up the episternal notch. He was operated upon under chloroform anesthesia, and through a transverse incision the dissection was carried down to the cyst which was punctured, allowing about one-half pint of thin, watery fluid to escape; this immediately relieved the dyspnea. It was found impossible to enucleate the cyst as it extended far down behind the sternum and sternal end of the clavicle into the thorax. The upper free portion of the cyst wall was removed and a soft drainage-tube and wick of gauze inserted into the intrathoracic portion. In three weeks' time there was only a small discharging sinus in the neck and it closed entirely a few weeks later. Martin collects 6 other cases of these large intrathoracic cysts from the literature, and believes that the diagnosis depends upon symptoms developing slowly, and the soft, fluctuating character of the tumor. There will be cough and dyspnea from pressure on the trachea or bronchi, paralysis of the recurrent laryngeal, widening of the pupil from pressure on the ocular pupillary fibers of the sympathetic, dilatation of the veins of the neck, weakness or absence of the carotid or radial pulse, and dulness over the upper part of the chest. In the differential diagnosis must be considered hypertrophy of the thymus, enlargement of the tracheo-bronchial lymph nodes, aneurysm of the aorta, or newgrowths or cysts arising in one of the mediastinal structures. As a rule, the tumor can be palpated in the neck just above the sternal notch or clavicle, and it usually increases suddenly upon coughing and moves upon swallowing in the case of goitre. In the cases reported, no attempt has been made to remove the cyst wall of the intrathoracic portion, the cyst has usually been opened, the cyst wall sutured to the margin of the skin wound and drained. Recovery has been the rule.

Kreuzfuchs² reviews the entire subject of intrathoracic goitre and discusses the history, the relationship between intrathoracic goitre and neighboring organs, its prevalence, the symptoms it induces, especially those on the part of the lung, the heart or mediastinum in general, and the differential diagnosis. Operation is preferred to all other measures of treatment, but intense dyspnea might be combatted by the application of ice to the neck if the goitre has suddenly increased in size; by the use of morphine if there is spasm of the glottis, or by the

¹ *Annals of Surgery*, 1911, vol. liii, p. 737.

² *Centralbl. f. d. Grenzgeb. d. Med. u. Chir.*, 1911, vol. xiv, p. 209.

giving of general anesthesia if the goitre has become incarcerated. He reviews one hundred and sixteen articles bearing on the subject.

Exophthalmic Goitre. The attempt to solve the causation of this disease furnishes one of the most fascinating problems that modern medicine has to deal with. Although many other explanations have been offered, we mostly—physiologists and therapeutists—adhere to the conception of Moebius that the manifestations of the disease are best explained by a state of overactivity of a diseased gland or vicious activity induced by some stimulus at present unknown. The investigations during the last year approach the subject from different directions and seem to help a little toward the final solution of the problem. Such research is of immense importance to the surgeon, because surgery at the present time offers the best hope of cure or amelioration of the distressing symptoms experienced by sufferers from this disease.

Marine and Lenhart¹ contribute an excellent discussion of the different types of thyroid changes, and offer another classification to the many we already have. The paper is difficult to abstract because the authors believe that "there is as yet no evidence of any disease entity, with the possible exception of tumors, arising in and due primarily to changes in the thyroid." They describe the normal gland and believe that, as a result of increased physiological activity, abnormal cell growth occurs which may vary from the slightest departure from normal (hypertrophy) to marked proliferation (hyperplasia). This active hyperplasia may not only develop from the normal gland but also from colloid glands, the latter being defined as "that anatomical state of the thyroid which is present when an actively hyperplastic gland ceases further growth and returns to the condition nearest normal that such a gland can assume."

In a subsequent paper² they discuss more in detail the physiological relation of the thyroid gland to the symptom-complex of exophthalmic goitre, based on an analysis of 69 cases clinically diagnosed as exophthalmic goitre at the Lakeside Hospital, Cleveland. They state that the anatomical changes in the several body tissues in exophthalmic goitre are variable and manifold, and that any attempt to raise the anatomical changes of certain tissues (formerly the nervous tissues, now the thyroid gland) to the roles of primary factors leads to conflicting hypotheses and controversies. The series of anatomical changes which occur in a thyroid as it passes from its normal or its colloid state through active hyperplasia and into atrophy or to colloid goitre, represent this tissue's biological reaction whenever those biochemical disturbances in the nutrition of the organism occur which excite its compensatory hypertrophy.

The anatomical changes in the several body tissues in exophthalmic

¹ Archives of Internal Medicine, 1911, vol. vii, p. 506.

² Marine and Lenhart, Archives of Internal Medicine, 1911, vol. viii, p. 265.

goitre are variable and manifold. The most prominent and most constant change is active hyperplasia of the thyroid and lymphoid tissues. These changes are not constant, since the exophthalmic goitre syndrome, as at present recognized, may co-exist with a normal thyroid, with a colloid goitre, with an actively hyperplastic thyroid, with an atrophic thyroid, or with a tumor of the thyroid.

One important point is brought out by these writers and that is that in response to stimulus, the thyroid not only becomes actively hyperplastic, but that later regressive or involutionary changes will also occur. One must reckon with all degrees of these regressive changes, from the marked hyperplasia back to the pure colloid gland; just as one has to reckon with all degrees of the progressive changes from the normal or colloid gland up to marked hyperplasia. They believe that the condition of the thyroid gland should be carefully investigated in a given case, and an attempt made to distinguish the regressive from the progressive changes. A clear idea as to how to do this is not given. They say that the clinical history is of value, and that the iodine content is of material help.

Another statement made by Marine and Lenhart is also interesting; they believe that both in cretinism and in myxedema a well-marked active hyperplasia is followed by atrophy, the usual end of an active hyperplasia unless terminated by death or recovery of the individual. Rogers¹ states that in myxedema, the cause of the fatigue of the thyroid may be the same as in exophthalmic goitre, but the epithelium, in its attempt to metabolize iodine, is unequal to any effort at compensation and atrophies.

Rogers develops in detail his present hypothesis in exophthalmic goitre. Briefly, as a result of defective metabolism, great functional activity is required, and this increase of function implies a consequent fatigue which damages the biochemical relationship of the epithelium with iodine, and in an ineffective attempt to metabolize this element properly the epithelium proliferates too rapidly and disintegrates, and instead of a colloid containing the normal proportion of iodized proteids, there results one in which there is an excess of one or more elements and a deficiency of others. The excessive proteid designated as a nucleoproteid activates the sympathetic nervous system, and all glandular epithelium is thus unduly stimulated and one or more vicious circles are immediately started which perpetuate the process.

Beebe,² in discussing the etiology of Graves' disease, distinguishes the following groups: (1) Those following infectious diseases; (2) those following pregnancy or disturbed menstrual function; (3) those which arise in the course of simple goitre; (4) those which follow a

¹ Journal of the American Medical Association, 1911, vol. lvii, p. 806.

² New York Medical Journal, 1911, vol. xciv, p. 73.

period of physical or mental overwork; (5) those following a severe emotional disturbance or nervous shock of some kind.

I will call further attention only to the third of this group of which Beebe says, that the occurrence of Graves' disease in simple goitre is not common but that it does occur. A colloid goitre contains globulin stored up in abundant quantities and only needs some mechanism for causing an increased absorption of this material in order to obtain symptoms. It will be remembered that Marine and Lenhart believe that colloid goitre is simply a resting state of an active hyperplasia and that such hyperplasia may redevelop at any time from the colloid gland which does not essentially differ from that developed from the normal gland.

TREATMENT OF EXOPHTHALMIC GOITRE. According to Marine and Lenhart, the therapeutic measures at present employed may be divided into two groups as follows: (1) Those directed toward the correction of metabolic disturbances, and in particular the nervous exhaustion. (2) Those directed toward reducing or counteracting the thyroid reaction.

Under the first heading would come rest, exercise, diet, suggestion, and drugs. A carefully taken history is exceedingly important so as to ascertain the underlying factors in the central nervous system; exhaustion, whether it can be traced to worry, care, anxiety, fright, overwork, strain; infectious diseases, as typhoid fever, rheumatism, and influenza; gastro-intestinal disturbances or any of the many other disturbances as with which the symptom-complex may be associated.

Group 2 includes the measures directed toward reducing or counteracting a theoretical hypersecretion. Marine and Lenhart believe this theory to have but frail experimental basis. They discuss surgical measures first and include partial extirpation of the gland, arterial ligation, stretching or excision of the cervical sympathetic and various combinations of these. Their discussion of the value of surgical treatment is not of much value, as it seems to be prejudiced by the statement made previously that the experimental basis for operation is exceedingly frail. They do not believe that operation should be undertaken until the thyroid has returned to its colloid or resting state, whether this has occurred spontaneously during general treatment or has been hastened by the action of minute doses of iodine, but in each case the general indication for operation; as (1) the relief of mechanical pressure effect; (2) correcting deformities; (3) thyroid tumors; (4) psychic effects should be considered.

Kocher,¹ in his most recent paper, insists that removal of thyroid tissue is the logical treatment for exophthalmic goitre, and that the improvement in the operation will parallel the amount of thyroid

¹ *Archiv f. klin. Chir.*, 1911, vol. xevi, p. 403.

tissue removed; he, of course, believes that the thyroid itself is the source of the disease, and that its anatomical changes parallel disturbances in its functioning. He has had a number of patients who were not completely cured until after the third or fourth operation on the thyroid. He has performed 720 operations on 535 patients with a mortality of 2.3 per cent. (3.1 per cent. of the patients died). He has performed 4629 goitre operations in all, and of the last 629, 167 were Basedow cases, with 4 deaths (2.3 per cent.). Of the 17 deaths, 6 were due to pneumonia, 3 were due to anesthetic accidents; 3 to nephritis; 3 to "thymus death," and 2 to embolus. He believes that the use of local anesthesia avoids the dangers incident to anesthesia, and that if cases of nephritis, advanced heart disease, fatty liver or diabetes are excluded, the mortality would not be high. It is significant to note that 5 other patients with "status thymolympathicus" died suddenly during the period of preparation for operation. He believes that, in these cases, operation should not be attempted until the patient's condition warrants it.

Mayo¹ reports having performed over 1000 operations for exophthalmic goitre, with a mortality of 3.7 per cent. in vessel ligation cases and 3.9 per cent. in extirpation cases. Harris² has operated on 29 cases with 1 death; Bartlett³ has done 45 partial thyroidectomies with 2 deaths, and Terry⁴ reports 41 cases of hyperthyroidism with 1 death, and Rixford⁵ reports 23 cases without a death. Tinker⁶ reports that, during the past eighteen months, he and his associate, Dr. Prince, have performed 167 consecutive operations for exophthalmic goitre without loss of life (105 excisions and 62 ligations and partial operations).

I refer to these statistics in order to show that in the hands of a good surgeon, the patient suffering from exophthalmic goitre has but little danger to fear from the operation *per se*. The above statistics, both of those who have done hundreds of operations and those who have done but a few score, show that the mortality is exceedingly small.

Marine and Lenhart would not place much faith in these figures, but the evidence is too consistent to be denied.

While acknowledging that a larger percentage of improvement follows operative influence than in those treated medically, they quote from Bier⁷ that it is largely subjective during their stay in the hospital, etc. I might offer in opposition the investigation of Almartine and Perrin,⁸

¹ Illinois Medical Journal, 1911, vol. xix, p. 145.

² Texas State Journal of Medicine, 1911, vol. vii, p. 122.

³ Journal of the Missouri State Medical Association, 1911, vol. viii, p. 116.

⁴ California State Journal of Medicine, 1911, vol. ix, p. 120.

⁵ Ibid.

⁶ Journal of the American Medical Association, 1911, vol. lvii, p. 807.

⁷ Med. Klin., 1908, vol. iv, p. 16.

⁸ Lyon Chir., 1911, vol. vi, p. 46

who summarize 120 cases of exophthalmic goitre in which an operation was performed over three years previously. These were from the clinics of Mikulicz, Krönlein, Kocher, Kümmel, Riedel, Garre, Berg and Ackerman. In 85 (70.8 per cent.), the cure was complete; in 27 (22 per cent.), there was marked improvement; the remainder were not benefited. Mayo¹ states that 70 per cent. of his cases were cured, the remainder greatly improved. Baruch,² in a review of the ultimate outcome of the cases treated at the Breslau clinics, notes that the results of surgical treatment were immeasurably superior to medical measures. But the percentage of his traced cases is not great enough for me to offer his figures as evidence or to further discuss his paper.

Marine and Lenhart, in their second paper, discuss the relation of postoperative mortality to the anatomical changes in the thyroid and lymphoid tissues and to the iodine content of the thyroid.

Of the 69 cases included in their study, 12, or 17.4 per cent., died. There were 3 cases with adenoma, with no mortality; 5 cases with normal or normal-colloid glands, with no mortality; 18 cases with pure colloid goitre, with 2 deaths (11 per cent.); and 43 cases of active hyperplasia, with 10 deaths (23 per cent.). It would seem that the highest mortality occurs in those cases with advanced degrees of active hyperplasia. Of course this means nothing, as it is true of other diseases; for instance, the highest mortality in appendicitis is seen in those cases with the greatest area of peritonitis.

Concerning the relationship of mortality to the iodine content, they found the mortality highest in those cases with low iodine content. They do not believe that the phenomena of high pulse rate, high temperature, and death in these cases is due to the squeezing of the thyroid secretion into the organism from gland manipulation at operation, because such symptoms occur after arterial ligation; because the highest mortality occurs in those patients with small cirrhotic glands or with myxedema, and also because patients operated upon for other causes may develop such phenomena. They quote Hirst³ as having collected 71 operations other than thyroid in cases of exophthalmic goitre, in which the same phenomena were present, and 15 terminated fatally. They do not believe that the lymphoid hyperplasia of the thyroid, etc. (status thymolymphaticus), is the cause of death. Finally, they believe that death is probably the result of the failure to compensate in some general nutritious disturbance.

Crile⁴ also discusses these factors and offers some new ideas upon the technique of operations and upon certain of the complications thereof. He believes that in operations for exophthalmic goitre, the

¹ Illinois Medical Journal, 1911, vol. xix, p. 149.

² Beit. z. klin. Chir., vol. lxxv, Heft. 2.

³ American Journal of Obstetrics, 1905, vol. lii, p. 367.

⁴ Journal of the American Medical Association, 1911, vol. lvi, p. 637.

principal risk is an acute hyperthyroidism against which there is no known specific remedy. In considering the cause of this acute hyperthyroidism, we must analyze the role played by (1) hemorrhage; (2) infection; (3) manipulating and cutting the thyroid; (4) anesthetic; (5) the psychic disturbances; and (6) the operative trauma to tissue other than that of the thyroid.

He does not believe that hemorrhage or infection play any part in the etiology, and, in view of the fact that massage of the gland, as done by osteopaths, is not followed by hyperthyroidism, nor does it develop in operations where raw surfaces are exposed for the thyroid secretion to escape, the "raw surfaces" and "squeezed juice" hypotheses do not explain hyperthyroidism adequately. He also concludes that general anesthesia *per se* contributes a minor factor, and local anesthesia *per se* no factor in the production of this specific reaction.

As a result of these conclusions, he concludes that the exacerbation after operation is not due to the commonly accepted cause, such as escape of thyroid secretion into the circulation, but is due to injury to tissue and to fear, and that it may be prevented by excluding the psychic factor, and by blocking the nerve supply of the field with local anesthesia so that no impulse arising from the injury of operation can reach the brain. The method of quieting the patient has been previously discussed,¹ and to this preliminary preparation Crile now adds the local anesthesia, the operative field being as completely cocainized as if no general anesthesia were being given.

As to etiology, he concludes that in exophthalmic goitre a pathological reciprocal interaction between the brain and the thyroid glands exists, and that this reciprocal interaction can be maintained through a nerve connection only, or possibly by a hormone action. It is generally believed that the benefit following ligation of the superior thyroid artery is due to the diminution of the blood supply, but Crile believes that this is an inadequate explanation of the vast clinical transformation and the symptoms lasting months and sometimes years, following ligation. The nerve supply of the thyroid glands enters along the walls of the bloodvessels and the value of ligation probably lies mainly in its breaking apart of the nerve connection with the brain.

He believes that the disease may be cured (1) if the brain cells are sufficiently repaired by absolute rest; (2) if the nerve connection between the brain and the thyroid be interrupted in part by tying the upper thyroid pulse, which includes also most of the nerve supply, or (3) if the secreting structure of the thyroid be diminished by partial excision or by cytolytic serum (Beebe's).

Of these three methods, excision is the most effective, and its value lies in the diminution of the total quantity of gland structure and the

¹ PROGRESSIVE MEDICINE, March, 1910.

breaking of the nerve supply as well; but patients operated upon should be given a prolonged rest cure, recovery taking approximately the same length of time as in a nervous breakdown from other causes.

LIGATION FOR HYPERTHYROIDISM. In the discussion on Mayo's paper, Bevan¹ described his technique. He makes a small incision, about an inch and a half in length, parallel with the normal skin folds of the neck just at the upper border of the thyroid gland, and just in front of the sternocleidomastoid. The incision is deepened down to the deep fascia and the sternocleidomastoid drawn to one side. The omohyoid passes directly in front of the artery and this little point in surgical anatomy should be remembered, viz., that the artery below the hyoid bone is internal to the carotid and the sternocleidomastoid. You find the large artery before seeing the pole of the gland itself and follow it down to the pole. In many cases the mere ligation of the superior thyroid will suffice. In the more radical operation of removal of one lobe of the gland, the procedure should be the Kocher incision, and ether anesthesia as a rule.

In closing the discussion, Mayo stated that there are one or two points concerning ligation that are worthy of discussion. If the case is so bad that you do not feel warranted in doing a thyroidectomy, the ligation of both superior thyroid arteries and nerves and lymphatics is indicated. If the resulting improvement does not permit thyroidectomy, it is better to take out part of the gland. If the patients relapse they can be helped by resection or ligation of the remaining lobe. They have found it necessary to ligate the third artery several times. Every tenth human being has a fifth artery coming up along the line of the trachea as an anomalous vessel. The left recurrent laryngeal nerve sets deeper than the right, and on that account it may be caught by pressure, therefore the tumor in the right lobe is more apt to produce paralysis of the left, than of the right recurrent laryngeal.

Boiling-water Injections. Porter² offers a new and novel method of treatment which he thinks especially adapted to the very mild and the very severe cases. The injections are made within the capsule, avoiding the immediate vicinity of the parathyroids and recurrent laryngeal nerves, and with the same general precautions that govern the boiling-water treatment of angiomas. From 40 to 160 minims were injected at each point, from one to three points being injected at each sitting. He has injected 4 patients twenty-nine times, with marked improvement in every case. The method seems to me to be irrational and with but little to commend it but simplicity.

Cervical Sympathectomy. Last year I presented a brief abstract of Jaboulay's paper. Recently, Chalié,³ in a long paper, discusses

¹ Illinois Medical Journal, 1911, vol. xix, p. 109.

² Journal of the American Medical Association, 1911, vol. lvii, p. 1120.

³ Lyon Chir., 1911, vol. vi, pp. 8, 285, and 555.

the entire subject and reviews the operations performed by Jaboulay from 1906 to 1911, 31 in number. He is enthusiastic about the method and believes that the operation is easier, more logical, and more benign than removal of the thyroid. His figures hardly bear him out, however, and the method is not one to be extensively used. He explains exophthalmic goitre as the result of intense stimulation of the cervical sympathetic, this nerve being the intermediate link between the primal cause of the disturbance and the disturbance itself. By cutting out the intermediate link, the symptoms are arrested. The modern operation of ligation, however, not only cuts off the blood supply to the gland, but also divides the sympathetic fibers—a point often overlooked. Accordingly, I do not think the operation is often indicated. The technique is as follows: An incision is made from the middle of the posterior edge of the mastoid process, parallel to the posterior border of the sternocleidomastoid muscle, to the crossing point of the external jugular vein; the vessels, spinal accessory nerve, and pneumogastric nerve are recognized and, together with the muscle, retracted inward; the deep fascia is incised and the sympathetic exposed, grasped with a hemostat and divided. By pulling on the nerve and by partial division of the splenius muscle, the superior ganglion is found and the nerve divided above.

Serum. The work of Rogers and Beebe has been reported in this review several times, and, in a recent paper, Beebe¹ states that during the last four years more than 1500 cases have been treated with serum, with 50 per cent. of cures and from 15 to 20 per cent. of failures. In most instances, however, the patients cured still possess palpable glands. Taylor² prepared thyroid proteid according to the method of Beebe and had it tried out by Brown in several cases of active exophthalmic goitre. Not only did the serum produce no change or amelioration of the symptoms or signs of the disease, but large amounts of serum could be injected without the causation of any results whatever. The specific reaction of the serum, according to Taylor, gradually decreases, and after a year could no longer be elicited. Marine and Lenhart have tried the serum in 14 cases but no improvement could be made out above what normally occurs with rest in bed. In 3 cases examined histologically (1 during and 1 about four weeks after treatment) they could not detect any lytic action on the thyroid epithelium. Beebe,³ in reply to Taylor, objects to the "sweeping statement condemning the whole procedure with no description of cases treated, length of time treated, or the dosage employed."

Dayton⁴ reports the results of the treatment of 5 cases with *thyroid-*

¹ New York Medical Journal, 1911, vol. xciv, p. 73.

² Journal of the American Medical Association, 1911, vol. lvi, p. 263.

³ New York Medical Journal, 1911, vol. xciv, p. 73.

⁴ Journal of the American Medical Association, 1911, vol. lvi, p. 1176.

ectin, a preparation which enjoys considerable popularity at the present time, without any different result from that obtained by the ordinary treatment of rest, suggestion, and regulation of habits.

Relation of the Thyroid to Uterus and Appendages. Goodal and Conn,¹ as a result of a long study, conclude that the uterus is devoid of any influence upon thyroid activity except in that its function may affect the ovarian function and through this the thyroid. Thyroid activity is, in a measure, under the governance of ovarian activity, and hyperactivity of the ovaries is a frequent cause of a development of exophthalmic goitre. Diminished or absent ovarian activity usually coincides with myxedema. Puberty, menstruation, pregnancy, lactation and menopause exert a profound influence upon thyroid secretion. It is the secretions from the interstitial cells and not from the corpora lutea which seem to bring the ovary and thyroid in such close relation. Porter² also calls attention to diseases of the thyroid in the female and he gives the history of 6 cases in which the thyroid gland was believed to be a factor in the production of diseases in women. For instance, one patient with intractable vomiting at pregnancy was cured by the administration of thyroid extract; another case of premature detachment of the placenta is ascribed to hyperthyroidism, and the same affection is blamed for amenorrhea in a third. He believes that the fat, phlegmatic women with amenorrhea probably need thyroid extract, while her emaciated sister will probably need treatment directed against overactivity of the thyroid. Hertzler³ discusses the relation of pelvic diseases to exophthalmic goitre, and reports 12 cases in which there had been definite pelvic disease antedating the hyperthyroidism for many years. He believes that these two affections frequently co-exist and that the relief of the pelvic lesion is, in certain cases, followed by the amelioration of the exophthalmic goitre.

THE PARATHYROIDS

It is interesting to observe the number of cases that are slowly being added to the literature in which improvement or cure of tetany has resulted from grafting, especially as the experimental work is generally discouraging. Recently, Landois,⁴ after extensive experimental research, states that there is little hope for successful transplantation of organs with an internal secretion. It would seem possible to explain the improvement in many cases by a compensatory hypertrophy of the fragments of the thyroid left, or an accommodation of the organism

¹ Surgery, Gynecology, and Obstetrics, 1911, vol. xii, p. 457.

² American Journal of Obstetrics, 1911, p. 781.

³ Journal of the American Medical Association, 1911, vol. lvii, p. 2076.

⁴ Brit. z. klin. Chir., 1911, Band lxxv, Heft 2.

to the deficient parathyroid secretion. The following reports possess special interest.

Brown¹ reports the case of a woman, aged twenty-four years, who was operated upon for a typical exophthalmic goitre. Four days after the operation, at which time nearly all of the thyroid was removed, the patient complained of a feeling of stiffness in both knees and the left leg, with feelings as of pins and needles. Shortly after this there was marked and painful tetany. About three weeks after the operation, although treated by the administration of calcium lactate and an emulsion of fresh parathyroids, she developed a terribly severe attack of tetany. The parathyroid emulsion was repeated, and an emulsion made from dried parathyroids was also injected, but no benefit was noted. It was then decided to implant two parathyroids from the living dog, but two weeks later there was a return of symptoms, slight at first, and then increasing in severity. Another parathyroid was implanted, and finally the whole thyroid; and two or three of the parathyroids of a small monkey were transplanted into a space prepared beneath the patient's left sternomastoid muscle. From this time on there was no more of the definite attacks of tetany, and the patient, on the whole, was decidedly better; but there was complaint of stiffness affecting the arms and the legs, of burning sensations, of tightness about the heart and twitching of the left arm. Finally, three parathyroids, in a piece of the thyroid as big as a small walnut, removed from a patient who had died one-half hour before, were transplanted beneath the left rectus muscle. From this time on, improvement, though slow, was steady and uninterrupted.

Brown believes that there is no hope of a permanent cure of tetany apart from the successful implantation—successful in the sense of their permanent reception, life and growth as part of the body—of parathyroids from another body.

He found that chloral hydrate, and, to a lesser degree, chloretone, were useful in the palliative treatment of the attacks; 5 grains half hourly or hourly would often seem to check or mitigate the oncoming attack. Pituitary extract, thyroid gland substance, and calcium lactate were of not the slightest use. The statement regarding the latter drug is of great significance in view of its universal use at the present time. It is also interesting to note the failure of the transplantation of the parathyroids of the dog to relieve the symptoms; this, of course, being due to the cytolytic action of the body fluids on heterologous tissues.

Groves and Joll² report a similar case in a woman, aged nineteen years, who had had two operations for typical exophthalmic goitre, at which the right lobe and isthmus and the greater part of the left

¹ *Annals of Surgery*, 1911, vol. liii, p. 305.

² *British Medical Journal*, 1910, No. 11, p. 1965.

lobe respectively were removed. It was thought that the parathyroids were left intact.

Five days after the second operation, a severe attack of typical tetany developed. She was treated by calcium lactate, morphine, saline infusion and thyroid extract and was improved, but the tetany continued. The symptoms of Graves' disease, except exophthalmos, continued. The face and hands then became puffy, menstruation ceased, and myxedema was suspected. Six months later a piece of thyroid tissue from another patient was grafted in the neck; typical tetany was developed which was cured by hypnotism. The general condition improved, the menses reëstablished themselves, and the tachycardia mostly disappeared. About six weeks after the grafting, the skin over the site became inflamed and painful, and, after fomentation, the wound opened and discharged a small quantity of thick fluid and a catgut suture, after which it healed up. Krabbel¹ reports an interesting case of tetany following strumectomy done many years previously. After seven years, four parathyroids from another goitre patient were implanted in the tibia. Improvement gradually followed, completely relieving the patient of the annoying manifestations of her postoperative tetany.

THE THYMUS GLAND

Persistent Thymus. Boggs² examined 66 girls in an orphan asylum for colored girls, during an epidemic of measles. In age they were between five and eighteen years, and 35 showed signs of persistent or enlarged thymus. All but 3 of the positive cases showed general lymphadenitis of varying grades. Many had also hypertrophic tonsils. Fourteen had measles or were convalescing from measles, and, of these, 12 had an enlarged thymus. Boggs describes the percussion signs of the enlarged thymus quite completely in the following words: (1) The thymus is higher and more superficial than the mediastinal lymph glands usually involved in tuberculous or other mediastinitis, or which may be the seat of primary or metastatic tumors. These lymphatics lie deep, near the hilum of the lung, and, when diseased, are usually more or less fixed by adhesions to the surrounding tissues. It is further to be observed that thoracic aneurysms, tumors, or inflammatory masses of the mediastinum are practically fixed in position and no considerable change in percussion is made out when the head is retracted. (2) Thymus dulness is almost constantly much more marked on the left of sternum than on the right. (3) Thymus dulness can be made to shift by the following maneuver: The patient sits up, the back

¹ *Beit. z. klin. Chir.*, 1911, Band lxxii, Heft 2.

² *Archives of Internal Medicine*, 1911, vol. viii, p. 659.

is supported by the nurse or assistant, if necessary. The chin is depressed toward the sternum. The dulness is outlined behind the manubrium and in the interspaces, then the head is retracted as far as possible toward the midline of the back and, upon repeating the percussion, the lower border of dulness will be seen to have shifted upward, often as much as an interspace or more. Upon again depressing the chin, the dulness assumes its former position. In recognizing minor degrees of movement, it is advisable to keep the pleximeter fingers constantly in place, avoiding the slight movement of the skin by first pushing the skin up toward the neck before the retraction of the head puts it in tension.

Another point which may be noted here is the fact that, in some cases of persistent or enlarged thymus, there may be no dulness in the first interspace, but only in the second and below it. In such instances, a shift in both upper and lower borders of dulness may be made out.

Aviragnet¹ calls attention to the difficulty of distinguishing between hypertrophy of the thymus and diseases of the bronchial glands. When the disturbance in the breathing comes on after bronchopneumonia or whooping cough, disease of the nodes is more likely to be the cause of the stridor than enlargement of the thymus, but with congenital stridor there is greater probability of the thymus being at fault. He reports a case in which operation was done in supposed hypertrophy of the thymus, but the trouble was due to hypertrophied lymph nodes. Veau² also calls attention to the possibility of error in mistaking enlarged glands for a hypertrophied thymus. He has performed thymectomy ten times, and, in 3 of these, the error above-mentioned was detected. He operates only when dyspnea or suffocation seem to necessitate it, and even then he does not promise to cure the stridor by thymectomy.

I have previously referred to the belief of Marine and Lenhart that death does not occur in exophthalmic goitre from hypertrophy of the thymus. Gebele³ comes to the same conclusion. He believes that the thymus hypertrophies as a natural process to do the work which the diseased thyroid is unable to accomplish. The death of persons with exophthalmic goitre with a co-existing abnormally large thymus has nothing to do with the persistent thymus. The more pronounced the disease of the thyroid, the larger we may expect to find the thymus. If found greatly enlarged, he believes that it is wiser to refrain from operating in a case of exophthalmic goitre, not on account of danger from the thymus, but because its enlargement shows that the thyroid is irreparably damaged. On the other hand, Capelle and Boyer⁴ advise thymectomy in cases of persistent thymus and exophthalmic goitre and report a case in which this was done.

¹ Bull. de la Soc. de Péd., 1911, vol. xiii, No. 3.

² Ibid.

³ Beil. z. klin. Chir., 1911, Band lxx, Heft 1.

⁴ Ibid., Band lxxii, Heft 1.

Effect of X-rays. I have previously referred to the treatment of enlarged thymus by the *x*-rays, and, according to several observers, the value of the *x*-rays in cases of status lymphaticus with enlarged thymus, may now be considered as established. With the idea of investigating this finding experimentally, and with the further idea of elaborating the technique of the use of the *x*-rays in these cases, an experimental study of thymus involution was undertaken by Friedländer.¹

Rabbits were used in the experiment, and in each series, rabbits of one litter were chosen, one animal being retained untreated as a control. The region of the thymus and its immediate surroundings only were exposed to the action of the *x*-rays, particular care being taken to see that the region of the spleen did not come within the focus of the *x*-rays. As a result of the experiment, Friedländer noticed that the effect of the *x*-rays upon the thymus was the induction of a replacement fibrosis. By varying the number and intensity of exposure given, and the length of time the animal was permitted to live after treatment, it was possible to induce any degree of fibrosis from the very slightest up to a complete disappearance of all glandular tissue. When very intense exposure was given on successive days, it was found possible to cause the complete disappearance of the gland; the animal being killed directly after the last treatment.

Another point of great interest was that despite the care taken to preserve the spleen from exposure to the *x*-rays, a marked reduction in the size of the spleen, and a change in the histological appearance took place. The reduction in number, size, and clearness of outline of the Malpighian corpuscles is very striking and was found to be correlated in degree to the amount of fibrosis in the corresponding thymus.

Clinically, these experiments are of value and certainly seem to justify the belief that in the *x*-rays we have a therapeutic agent of value in the treatment of enlarged thymus. By its means it is possible to induce not only an involution of the thymus, but also, in cases of status lymphaticus, to reduce the size of the spleen, of the lymph nodes, and to change the lymphocytic blood picture to the normal one. Surgical intervention (thymectomy) has been successful in a number of cases, but, according to Friedländer, the operation is an exceedingly dangerous one, and complete thymectomy in the lower animals is invariably followed by subsequent developmental changes, manifested in the central nervous and osseous systems chiefly, and invariably leading to the death of the animal.

Sarcoma of the Thymus. Sheen, Griffiths and Scholberg² report 2 fatal cases of this rare condition, the chief interest of which are the

¹ Archives of Pediatrics, 1911, vol. xxviii, p. 810.

² Lancet, 1911, No. 11, p. 1253.

clinical characteristics. Both cases were in young males, aged seven and eighteen years respectively, and both had an acute onset. There was severe dyspnea, at first in attacks; dilated veins of the neck and thorax; swelling of the lower part of the neck, and dulness over the manubrium. Direct laryngoscopic examination was of value in determining the site of the obstruction. In both patients an operation was performed, the manubrium divided and the portions of the growth pressing on the trachea were removed. The dyspnea was permanently relieved. Death occurred three days later in one case, and two and one-half months later in the other. Full necropsy reports are given.

THE MAMMARY GLAND

Fibro-epithelial Tumors. Not so many years ago the benign tumors of the mammary gland were not definitely understood, and even their existence was unknown to many surgeons, with the exception of the small fibroma, or fibro-adenoma, or adenofibroma, as it was variously called. In 1905, Dr. Warren,¹ of Boston, published his classification of the fibro-epithelial tumors, which, while intricate, divides the different types into different groups, and clears up the subject materially. Recently, Greenough and Simmons² published a paper based upon the study of 44 breast tumors obtained from the Massachusetts General Hospital. They limit their discussion to the periductal fibromas, myxomas, and sarcomas of the fibrous group and to the fibrocyst-adenomata of the epithelial group.

Periductal Fibroma. There were 27 of these, 20 were single tumors and 7 were multiple. The size varied from that of a small marble to a mass as large as an orange. The tumors affected the right and left breast with equal frequency, the upper and outer hemisphere being affected in the majority of cases. The clinical characteristics revealed nothing new; the tumors occurring mostly in the breasts of young, unmarried women were of slow growth and of long duration, and in only one-third of the cases was pain of any kind complained of, and then it was usually described as of but slight significance. The authors were unable to distinguish between the intracanalicular and the pericanalicular types of tumors in regard to their clinical symptoms. Of this series, 14 were excised through an incision directly over the tumor, and in 11 cases a "plastic resection," after the method advocated by Warren, was done; in 2 cases, amputation was done, once under a mistaken diagnosis, and once because of the large size of the tumor. They believe that Warren's operation is the operation of choice.

Periductal Myxosarcoma. The writers of this paper bring the periductal myxoma and sarcoma together as a myxosarcoma. It seems

¹ Journal of the American Medical Association, 1905, vol. xlv, p. 149.

² Annals of Surgery, 1911, vol. liv, p. 517.

to me a very sensible view to take, as the distinction between the two is often impossible. They further conclude that the myxosarcoma is a periductal fibroma, the fibrous tissue of which has more or less taken on the change in characteristics (anaplasia) which mark the advance from benign to malignant growth. Clinically, these tumors occur at a period later in life than the fibroma, the average age being forty-nine years, but lactation appears to be in no way associated with the onset or progress of the tumors. The rate of growth is comparatively rapid and the tumor is encapsulated and non-adherent, unless necrosis of the tissue occurs. In sections of the tumor after removal, a grayish, more or less translucent tissue is seen, arranged in lobules and showing cysts or clefts. These tumors formerly were described as adenosarcoma, cystosarcoma, cystosarcoma phyllodes, etc. The latter term will be found in Billroth's *System of Surgery*. The treatment should be complete removal of the tumor by amputation of the breast, but the axillary contents and the pectoral muscles do not need to be disturbed.

The *fibrocystadenoma* only differs from the before-mentioned types in the relation of the component parts. In the fibromata, the epithelial structures are passively distorted by the growth of the periductal fibrous tissue, while in the fibrocystadenomata, in addition to this growth, there is a marked hyperplasia of the epithelial elements.

There were 10 cases in this group, in 2 of which both breasts were affected. They did not differ clinically from the fibromata—the average age of the patient, the rapidity of the growth, and the part of the breast involved being the same. Neither is adherent, nor are enlarged nodes usually present in the axilla. If cysts can be palpated, the diagnosis may be established, but this is not always possible. Discharge of blood from the nipple, present in 50 per cent. of cases, is also diagnostic. The treatment is that of periductal fibroma, the excision by the “plastic resection” method being favored.

Carcinoma. The disasters which occur in breast surgery are the result (1) of overconfidence in the diagnosis of benignancy, thus delaying the most favorable time for extirpation; (2) inadequate operation; (3) a disregard of the contraindications to operation, or the failure to detect them. After all, the only effective treatment of breast tumors, as yet giving any hope of permanent cure, is radical removal, and Richardson¹ condemns all other methods of treatment because they entail a loss of precious time. Non-operative measures should be used only in those cases which are by situation or extent hopeless. As contra-indications to extensive operations in the hope of permanent cure, he mentions metastasis above the clavicle, skin infiltration, and beginning involvement of the chest wall.

¹ Journal of the American Medical Association, 1911, vol. lvi, p. 315.

Reasonable hope of radical cure can be expected in slowly growing tumors, with but few perceptible lymph nodes in the axilla. Rapidity of growth or the slightest sign of infiltration or of edema in the breast, makes recurrence, after any operation for cancer in the breast, almost certain. A peculiar thickening of the skin over the breast, gradually shading off at the periphery is always a grave sign. A breast that is solid with the disease and edematous with the overlying skin infiltrated as far as its margin, is practically hopeless. Although when the disease has burst through the skin, as it were, and appears as a discolored mass surrounded by normal skin, the prognosis is not necessarily bad. The infiltration in all directions from the central focus makes unreasonable the expectation of radical cure. Close attachment of the breast or of the tumor to structures that cannot be removed, means hopelessness. A tumor so close to the periosteum of the rib that it can be separated only by stripping the periosteum from the rib or so close to the intercostal muscles that they must also be removed, is beyond the reasonable hope of permanent cure. A tumor so closely attached to, or grown into, the thoracic wall that resection of the ribs is necessary, is beyond the hope of cure, and should not be removed unless for palliative purposes. Infiltration of the axillary contents Richardson regards as a hopeless sign, and he never dissects the nodes from veins or other structures, with much prospect of a cure, unless they are separated by loose connective tissue. When they are separated only by a sort of cleavage from the veins, chest wall, or fascia, recurrence is almost inevitable.

We should include in the statistics of the radical cure of the disease by operation, those cases in which the tumor is freely movable, and in which there is no infiltration or close attachment to tissues that cannot themselves be removed. The incision should leave a liberal margin of uninfiltated, healthy tissue surrounding the tumor. Before operation, many of the unfavorable manifestations will not be apparent. In most cases, hopelessness is a matter of operative demonstration, for radical operation is never undertaken on tumors that are clearly hopeless. If any of these unfavorable things can be detected, almost the only justification of an operation is the chance that the case may not be as bad as it seems. Another justification lies in the fact that occasionally success is encountered, when the outlook is most unfavorable.

CARCINOMA MASTOIDES. This term is applied by Schumann¹ to a tumor, the *general characteristics* of which are rapid growth, with a violent irritation which produces a cellular infiltration closely simulating a primary mastitis. It arises suddenly, progresses rapidly, and is often accompanied by inflammatory phenomena. No special

¹ Annals of Surgery, 1911, vol. liv, p. 69.

tumor is formed, but the whole breast becomes enlarged and hard, the skin reddened, edematous, adherent, and the subcutaneous veins prominent. The adjacent lymph nodes usually are invaded early in the course of the disease, a general dissemination of the tumor rapidly ensues, terminating in death from acute toxemia, its total duration seldom exceeding a few months. The growth affects women in the first half of life and is most frequently associated with late pregnancy or lactation.

It *manifests itself* usually as a general painful and rapid enlargement of the entire breast without the presence of any previously noted mass or area of induration. The gland becomes reddened, hot, edematous, and may present a sense of fluctuation. The overlying skin becomes infiltrated and brawny, and small areas of necrosis may appear, and the skin immediately surrounding the breast may become indurated and reddened.

The *prognosis* is uniformly bad, as this is one of the most rapidly fatal of all malignant growths. Death has ensued within six weeks from the discovery of the tumor.

Carcinoma mastoides does not differ from certain forms of carcinoma simplex, and such distinction as there may be is due entirely to the interaction of the carcinoma and the profound inflammatory reaction produced by it. The excessive reaction of the special cancer cells upon the surrounding tissues—a reaction sufficiently marked to engender a general diffuse, round-cell infiltrate and connective-tissue hyperplasias so profound as to frequently result in breakdown and abscess formation—may be due to the influence of some peculiar toxin generated in the cells themselves, or to a localized loss of resistance to tumor invasion, inherent to the breast. When the essential elements of the mammary gland are in full activity, as they are in the period of lactation, they may be exceedingly vulnerable to the action of any foreign toxin. So that it is not unreasonable to assume that loss of vital resistance and the presence of a toxin may be the determining etiological factor.

Complete extirpation of the breast and lymph nodes should be performed, if the diagnosis has been made in time. In view of the dreadful malignancy of these cases, we should excise, for microscopic examination, a small portion of the breast in all cases of acute mastitis which do not yield promptly to the usual methods of treatment. In the writer's case, the patient has been treated expectantly for mastitis for three months.

THE TREATMENT OF INOPERABLE CARCINOMA OF THE BREAST. The effect of oöphorectomy upon breast cancer has been discussed in PROGRESSIVE MEDICINE a number of times, most recently in March, 1910. We have called attention to the fact that the operation, although practised abroad, especially in England, is not a popular measure in this country. We have published from time to time the experience

of surgeons, chiefly of Great Britain, in whose hands the operation has been followed by good results. Thus Beaston¹ writes that in a few cases he has seen a complete disappearance of the outward manifestations of the disease, and in a larger number some improvement in the general health and a retardation of the growth. In only a very limited number did the tumors disappear for any considerable time, one or two have had freedom from outward manifestations of the disease for five or six years, and several for two years. In the large number the growth recurred within twelve months, and as yet there have been no permanent cures. The most favorable cases seem to be those in which the carcinoma is not of an acute type, and in persons before the climacteric, although there be some benefit after the menopause, but the so-called acute cases, with or without visceral deposits, are not influenced in the slightest degree. The operation, which affects chiefly the cutaneous and subcutaneous nodules, and to a less extent the glandular enlargements, accomplishes its results by inducing a fibrous change in the affected tissues. It has apparently no effect on visceral and bony metastases. In view of the very low mortality of the operation *per se* it would seem to Beaston a perfectly proper procedure when its limitations are thoroughly understood by the patient.

Breast Abscess. For cosmetic reasons, free incision in the mammary gland, whether radiating or not, for the relief of breast abscess is undesirable. For this reason, I prefer a small incision to be followed by a Bier cup, and I have found this combination most effective. Seff² makes a small stab wound or puncture and, after evacuating the pus, washes the cavity repeatedly with a 1 to 5000 solution of bichloride of mercury and then fills it with an undiluted tincture of iodine. The application of the iodine usually produces a moderate amount of pain which lasts but a few minutes. The wound is neither packed nor drained, but covered with a wet dressing. The bichloride solution and the iodine are used at subsequent dressings (usually at intervals of twenty-four to forty-eight hours), and continued as long as there is any discharge. When the latter becomes serous, iodine alone is injected and a firm, dry dressing is applied. Within twenty-four hours after the first application of bichloride and iodine, there develops a well-marked zone of induration in the abscess wall, which persists during the active stages of the process but disappears within ten days after the wound has been closed and the cavity obliterated. In the majority of cases, resolution takes place within ten to fourteen days.

¹ Glasgow Medical Journal, August, 1911.

² American Journal of Surgery, 1911, vol. xxv, p. 227.

THE HEART

Surgery of the Heart. Because of the success attained in latter years in the radical treatment of wounds of the heart by suture, in not an inconsiderable number of cases this operation has lost some of its sensational features, and is being looked upon as one of the conventional procedures of emergency surgery. Now that the technique has been perfected, it behooves us to study the case a little more critically with a view of determining under what circumstances the operation should be resorted to. Under certain conditions delay seems advisable, and the following rules advocated by Brewster and Robinson¹ are worthy of attention. They believe expectant treatment may be justified in two groups of stab and bullet wounds of the thorax. (1) In rare cases direct heart injury alone may be suspected from the localization and symptoms. Intrapericardial tension from hemopericardium may develop until a small wound in the heart muscle is occluded by a blood clot in the pericardium before the fatal results of heart tamponade ensue. Careful examination of the patient should determine whether hemorrhage has been arrested or whether the pericardial tension is approaching the dangerous limits. (2) A group of cases in which the remoteness of the point of injury, the absence of extreme shock and hemorrhage; the lack of symptoms pointing to intrapericardial tension justify the presumption that the heart is probably not injured and that the lung wound is a small one. From such injuries of the periphery of the lung, with slight hemorrhage and an insignificant amount of pneumothorax, recovery is not uncommon. Such cases should be treated expectantly.

If, on the contrary, the hemorrhage is increasing, or the dangers of tension pneumothorax are imminent, even though the point of entrance excludes the possibility of heart injury, operation is indicated for the repair of the pulmonary wound, and, since the introduction of differential pressure six years ago, is a very much more justifiable procedure. If the pleura and lung are injured, and if the point of injury and other symptoms indicate probable heart injury, with signs either of hemorrhage into the pleural cavity or of increasing intrapericardial hemorrhage, operation should not be delayed.

The employment of a skin, muscle, and bone flap is contraindicated for four reasons: (1) Because the size of this flap must be previously determined and a definite area exposed, which may or may not be the most suitable one for the injury at hand. Reflecting the layers of the chest wall one by one, on the other hand, enables one to follow the course of the bullet by degrees, particularly when the point of injury

¹ *Annals of Surgery*, 1911, vol. liii, p. 324.

in the heart by no means corresponds to the skin wound. (2) The reflection of such flaps favors accidental injury to the pleura as well as to the intercostal and mammary vessels, which cannot be easily picked up until the whole flap is reflected. (3) Infection has been found to be favored by this flap method. (4) Air-tight suture of an osteoplastic flap is difficult.

There is reason to believe that the ultimate technique for the group of injuries, involving either the heart or lung or both, will be the employment, under differential pressure, of a long intercostal incision, with spreading of the ribs and exposure of both areas in question. The advantages may be summarized as follows: With the employment of differential pressure, the pleura may be opened wide without hesitation. There is no loss of time and effort to avoid injury to the pleura, which is usually unsuccessfully attempted in the extrapleural methods. All anxiety concerning the possible fatal effects of pneumothorax is obviated. Inflation of the lung discloses the injured area in the lung by the escape of air, facilitating their localization and repair. Differential pressure, by maintaining the expansion of the lungs, prevents sagging of the heart posteriorly upward and to the left. Both auricles and ventricles are accessible, and the posterior cardiac wall as well as the anterior. The reinflation of the lung at the end of operation, followed by tight closure of the intercostal wound, prevents the persistence of pneumothorax which is generally admitted to favor infection, the usual cause of death in cases surviving the operation itself. The wide exposure enables the operator to reach and compress the vessels at the base of the heart and control hemorrhage. Drainage of the pleural cavity should not be established at once for two reasons: (1) If a virulent infection has been introduced at the time of injury or operation, the introduction of a drain will have little influence on the infection process. If, on the other hand, the infection is less virulent and confined to the pleura, there is probably no danger in waiting until symptoms of empyema develop. Adhesions, too, may have occurred in the interim, which will tend to localize the septic process. (2) It is a well-recognized fact that the presence of pneumothorax favors infection, hence the presence of drainage at once establishes this unfavorable condition. In this connection it should be remembered that a closed pneumothorax also favors infection; that is to say, the air-tight closure of the thoracotomy wound without previous re-inflation of the lung. It is quite as important, therefore, to obliterate the pleural space before closure as it is to omit drainage. If this feature is neglected and the lung is left in the collapsed state, atmospheric pressure persists in one pleural cavity while the normal negative pressure remains in the unopened side of the thorax. The resulting inequality in the pressure of the two sides of the chest prevents the reëxpansion of the collapsed lung, and often causes a pleuritic transudate, which serves as

an admirable culture medium. To prevent this, the normal negative pressure in the operated side should be restored, either by artificial inflation just before the tying of the last wall suture, or by aspiration after the closure of the wound.

The following cases of wounds of the heart have been reported during the last year: Miel¹ removed a needle which had penetrated the cartilage of the fourth rib, and had caused pain upon exertion and syncope on many occasions. From these symptoms and accurate localization by the x-rays it was quite evident that the pericardium had been punctured.

Lott² discovered a wound of the left ventricle, which was so slight that closure by sutures did not seem justifiable. Accordingly, all clots were removed from the pericardium, and both the pleural and pericardial sacs drained. Very free drainage followed, the exudate from the pleura became infected, but the sinus eventually closed.

Erdmann³ introduced eight catgut sutures in the right ventricle, the heart wound being sufficiently large to admit the index finger. The pericardium was drained. The patient developed a lobar pneumonia and pneumothorax, but recovered and was out of bed on the fourteenth day.

Pikin⁴ found a longitudinal wound of the left ventricle which was about 1.25 cm. in length with smooth edges and no gaping. The pericardium was closed with a continuous catgut suture, and the wounds in both lungs and the diaphragm sutured. A pleurisy developed, but recovery followed without further complications.

A series of 10 cases is reported by Hesse, 6 of which were operated upon by himself. Of the 4 cases which he observed, 3 were stab wounds, 2 involving the left and 1 the right ventricle, all of which were fatal. The fourth case was a bullet injury of the thorax, which, though not puncturing the heart muscle, produced a hemopericardium. Relief was obtained upon opening the pericardium and evacuating the effusion. The sac was drained and recovery followed.

Of the 6 cases which Hesse operated upon, but 1 died. This patient sustained a bullet wound of the left ventricle, and during the operation the heart's action ceased and was only restored by an injection of camphor directly into the heart muscle. The remaining 5 cases were stab injuries, 2 involving the left ventricle, 1 the right ventricle, and 2 the right auricle. These 5 patients have remained well for a period varying from two to six years, and 4 have been able to carry on their usual occupations without any difficulty or discomfort.

¹ Denver Medical Times, January, 1911, p. 255.

² Virginia Medical Semi-Monthly, September 8, 1911.

³ Medical Record, December 17, 1910, p. 1095.

⁴ Arch. klin. Chir., 1911, vol. xciv, p. 1021.

Brewster and Robinson¹ report an unfavorable result in a case of a bullet wound of the left ventricle. Three catgut sutures were inserted, but the hemorrhage steadily increased and was finally controlled by a continuous suture. The heart contractions at this time became fibrillary in character and finally ceased.

ANALYTICAL TABLE OF HEART WOUNDS INCLUDING THOSE TABULATED IN PREVIOUS YEARS

	Cases.	Died.	Recovered.	Mortality. Per cent.	Recovered. Per cent.
Right ventricle	54	34	20	62.9	37.1
Left ventricle	74	34	40	45.9	54.1
Right auricle	7	22	5	30.0	70.0
Left auricle	3	1	2	33.3	66.7
Apex	6	3	3	50.0	50.0
Coronary artery	1	1	0	100.0	
Septum	2	1	1	50.0	50.0
Seat not stated	11	5	6	45.5	54.5
Total number				158	
Number of deaths				81	51.2
Number of recoveries				77	48.8

Pericardium. The removal of considerable portions of the pericardial sac may be necessary in operations for excision of malignant growths involving the chest wall. Methods by which this defect may be repaired had not been described until Robson² was forced to use a portion of the pectoral muscle for this purpose in 2 instances. His cases show that it is quite safe to remove even a considerable portion of the pericardial wall, and that the gap in the fibroserous sac can be efficiently covered in by a flap taken from the pectoral muscle.

We may expect more encouraging results after operations for the relief of symptoms due to non-malignant lesions of the pericardium. Jacob and Chavigny³ obtained an apparent cure in a patient suffering with *tuberculous pericarditis*. The patient, aged twenty-three years, complained of asphyxia, was cyanotic and showed enlargement of the heart area upon Röntgen examination. The evidences of venous stasis, common in these conditions, were not present. The case presented certain difficulties in diagnosis, but the latter was confirmed by a pericardotomy, under local anesthesia, which gave instant relief. The wound in the sac was not closed, so that the reaccumulating fluid might drain into the surrounding cellular tissue. The dyspnea, edema, and other symptoms incident to a tuberculous pericarditis, may be relieved by operation, but the infection often spreads to other serous sacs in the form of a polyserositis. A guarded prognosis should always

¹ Loc. cit.

² British Medical Journal, July 1, 1911, p. 11.

³ Revue de Médecine, 1911, vol. xxx, No. 7.

be given for this reason. Curtillet and Pélissier¹ found this to be so in a case in which Brauer's operation, cardiolysis, was performed. The patient was much improved, in that he was able in a short time to be about, and the edema disappeared.

INTRATRACHEAL SUFFLATION

Last year I discussed the principles underlying intratracheal insufflation and quoted the results derived largely from experimental sources. Since then several important contributions have been made, touching not only upon the laboratory but the clinical side of the problem. This method has been carried well beyond the experimental stage. I have been using in my clinic an apparatus designed by Dr. George P. Müller, which has demonstrated, at least to my satisfaction, that we are dealing with a means of inducing anesthesia not only absolutely safe, but, in selected cases, offering many advantages over any other conventional methods. My experience bears out all that has been claimed by Meltzer and Elsberg, and it covers a series of cases in which the administration of the anesthetic was essential to the proper execution and success of the operation. Included in my series were operations on the neck, buccal cavity, and brain. Particularly in the buccal cavity and in cerebellar lesions is insufflation anesthesia of special advantage. The apparatus is no more costly than that for nitrous oxide anesthesia, and both should be regarded as essential to the proper equipment of a modern clinic. The innocuousness of the insufflation is discussed by Meltzer,² who found that the method practised in a large series of animals for many hours, did not produce a single case of bronchitis or pneumonia. In two systematic series of experiments carried out by Githens and Meltzer, the possible dangers of aspiration were eliminated by severe tests. In one series, after filling the stomach with acid solution, vomiting was induced by hypodermic injections of apomorphine. The vomited material was left in the mouth and pharynx for a long period during insufflation. In another series, the mouth and pharynx were filled with a suspension of powdered charcoal. The animals were kept during this period under deep or light ether anesthesia. In not a single case in which insufflation was practised was vomited matter or particles of charcoal found in the trachea or bronchi. On the other hand, when a tube was in the trachea, but no air was driven through the intratracheal tube, the contents of the mouth and pharynx often came out through the free end of the tube. Furthermore, when deep anesthesia was induced, in these latter experiments, especially in the experiments with charcoal, the animals died in a few

¹ Lyon Chirurgical, May 5, 1911.

² Journal of the American Medical Association, 1911, vol. lvii, No. 7, p. 521.

minutes, and, at the autopsy, trachea and bronchi were found to be loaded with charcoal. When the animal was only lightly anesthetized, so that the deglutition reflex remained active, rapid swallowing seemed to clear away most of the foreign material present in the pharynx. These experiments demonstrate very positively the importance of the recurrent air stream in the insufflation method.

In another investigation, lobar pneumonia was produced in a series of nine dogs and, subsequently, insufflation was practised. Not a single animal of this series succumbed to pneumonia. These latter experiments certainly show that insufflation brings no greater danger to the respiratory organs even when the animals are already afflicted with such a serious disease as lobar pneumonia. These varied experiences would serve to indicate that intratracheal insufflation, far from being a menace to the respiratory organs, is rather capable of protecting them against the injurious invasions of foreign matter.

We turn now to intratracheal insufflation as a method of overcoming the dangers of pneumothorax. Some writers see in the intratracheal insufflation nothing more than a modification of the Brauer, or the overpressure, method; neither do they anticipate that it is capable of accomplishing more than that method. This view is based on an unfamiliarity with the essential principles of either of the methods and is entirely erroneous. The methods of overpressure, as well as that of underpressure, aim only to keep the lungs distended, but do not provide for any ventilation of the lungs. This is left, as in the normal animals, entirely to the activity of the respiratory muscles. It is fundamentally different, however, with the method of intratracheal insufflation; if it is properly adjusted, it is able to carry on the process of ventilation most effectively without the aid of the respiratory mechanism. This difference is a vital point, which, however, is imperfectly understood. Attention was directed to the importance of this difference by a series of experiments in which the Brauer method and the method of intratracheal insufflation were compared. In these experiments, after both pleural cavities were kept widely open for one hour or an hour and a half, both lower lobes of the lungs were removed from their approximation to the diaphragm and the posterior walls. When using the Brauer method, the animals died in a short time, often in two or three minutes. Furthermore, replacing the lobes and proper artificial respiration did not, in many cases, have any influence upon the heart action. In the insufflation method, on the other hand, lifting the lungs out from the thoracic cavity never interferes with the function of the heart. A further difference in the behavior of the heart was observed, when the pressure was discontinued and the lungs permitted to collapse. In the Brauer method, within a few seconds, the heart became slow and stopped beating in less than half a minute; while under insufflation a minute and a half and even two minutes passed before the effects of asphyxia

showed themselves. The same difference is manifest in the readiness with which the heart recuperates after the pressure is restored again. The difference, according to Meltzer, lies in the fact that in the Brauer method the respiratory process is frequently deprived of nearly all of its factors of safety, while in intratracheal insufflation these are not disturbed. The observations of insufflation anesthesia with chloroform instead of ether have not been so extensive, but they have been sufficient to bring out certain points. Prolonged anesthesia under chloroform will lead sometimes to hyperemia and even to inflammation of the lung; chloroform anesthesia requires careful supervision; it affects readily the functions of the medulla; but with the proper supervision it may be used for shorter operations with perfect confidence and may be employed especially in individuals resistant to ether, at least for the purpose of the induction of the anesthesia.

At Mt. Sinai Hospital, New York, Elsberg¹ anesthetized about 200 patients by means of intratracheal insufflation, and has found the method very valuable for a great many operations. In all but a few cases the anesthesia was satisfactory and particularly free from complications and after-effects. It is very easy to keep the patients under full anesthesia, vomiting has never occurred during the anesthesia, and the patients awakened very rapidly, especially if pure air were insufflated for a few minutes before the intratracheal catheter was withdrawn. Vomiting after the operation was very unusual no matter what the surgical procedure performed, and the patients never complained of pain or discomfort in the larynx. Pulmonary complications had not been seen.

Operations under insufflation anesthesia were performed upon patients suffering from a variety of acute and chronic surgical diseases. The anesthesia has been of special value in operations upon the neck, and more especially in those around the trachea, such as thyroidectomy. Not only is the anesthetizer never near the field of operation, but the operator can work around the trachea without causing any interference with breathing. There is no danger of sudden collapse of the trachea when a large goitre has been removed, and no matter how much the trachea is handled, the anesthesia continues smoothly and evenly. Intratracheal anesthesia should be very advantageous for the operation of laryngectomy. The intratracheal tube could be either introduced through a tracheotomy wound and the trachea packed with gauze above this point, or the tube could be passed through the glottis in the usual manner and removed only at the moment when the trachea is to be divided across after the entire larynx is free.

Operations upon the face, jaws, and mouth, where the buccal cavity or pharynx has to be invaded, are made more easy and safe when done

¹ *Annals of Surgery*, December, 1911, vo. liv, p. 750.

under insufflation anesthesia. No blood or secretions can run down the trachea, for the outflowing current passing upward in the trachea blows out any fluid that might enter the larynx. In operations upon the brain and spinal cord, where the patient must often be placed in the prone position, the anesthesia is very useful. As soon as the intratracheal tube has been introduced and the insufflation has been begun, the patient's head and body can be placed in any position desired and the anesthesia given from a distance. The anesthetizer need not be seated underneath the table as is ordinarily necessary.

Insufflation Anesthesia in Thoracic Surgery. Insufflation anesthesia is a positive pressure method, and was primarily suggested for intrathoracic surgery. On account of the simplicity and apparent safety of the method, it may take the place of all the more complicated positive and negative pressure cabinets. The operations upon animals gave such very satisfactory results, that we were very hopeful that the method would give as good results in thoracic operations in the human being. Great care was used in the first human operations, but with increasing experience, more and more confidence has been gained in the efficiency of insufflation in man. Elsberg gives the histories of the thoracic operations in which he used intratracheal insufflation. The list includes thoracotomy for abscess of the lung; an exploratory operation for carcinoma of the esophagus; bronchiectatic abscess; interlobar empyema, and resection of the chest wall for recurrent carcinoma. In all the thoracic operations reported, as well as in a large number of thoracotomies for empyema that have been done, the anesthesia was a very good one. In not a single instance were any changes in the patient's condition observed when the pleural cavity was first opened; the pulse remained regular and of good quality, and the patient's color unchanged. In several cases there were adhesions between the visceral and parietal pleura, but in most there were none, so that a practically normal pleural cavity was invaded. There has been no occasion to operate upon a patient in whom both pleural cavities had to be opened. Such a case would be the supreme test of intratracheal insufflation. There is, however, every justification for the belief—based upon the results of animal experiments in which both pleural cavities were widely opened, and upon the experiences with insufflation as a method of artificial respiration in several patients in whom all respiratory movements had been abolished—that it will be safe to open both pleural cavities if necessary, as far as the dangers from a double pneumothorax are concerned. The cases here reported are too few to allow one to draw final conclusions, but they do indicate that in the method of intratracheal insufflation we have at last a simple method for the avoidance of those dangers which have prevented the development of surgery of the intrathoracic viscera.

Intratracheal Insufflation with Nitrous Oxide. According to Cotton and Boothby,¹ the advantages of nitrous oxide (with oxygen) as an anesthetic are beginning to be recognized, as are those of the intratracheal administration of anesthetics. If air and ether are better borne and safer when given intratracheally, it stands to reason that intratracheal administration should work well with nitrous-oxide-oxygen anesthesia. If oxygenation by gas diffusion without respiration (or with but little respiration) works well with air and ether, it should also work well with nitrous oxide and oxygen. At first nitrous oxide was given with the usual oxygen co-efficient till consciousness was lost and anesthesia was then deepened by the addition of ether until the laryngeal reflex was abolished, and then the intratracheal tube was introduced. No air was used, only nitrous-oxide-oxygen-ether, and presently the ether was cut out, and the greater part of the operation was performed under nitrous oxide alone. At no time was there the slightest trouble. The anesthesia seemed to differ in no way from the usual air-ether cases. A relative apnea was quickly established and continued more or less complete throughout. The color was good, the skin dry and warm, and the pulse (despite a moderate loss of blood during the rectal excision) continued excellent. At the end of the operation the patient was "blown out" with pure oxygen as usual. For a minute or two the pulse and color continued good, but he did not breathe; then, as the CO₂ began to approach the normal, natural breathing was resumed just as in the ether cases, although the quiet interval was perhaps longer. If nitrous oxide oxygen is better than ether, as many believe, and if intratracheal ether is better than ether inhaled through a cone, then, logically, there is much to be said for intratracheal gas-oxygen anesthesia.

THE LUNGS

Empyema. The method of procedure necessarily varies according to whether we are dealing with acute or chronic cases. Fortunately, cases of empyema are brought to the surgeon much sooner than they used to be, before the visceral pleura has become too thick to prevent expansion. Personally, I believe, in acute cases, though ample drainage must be provided for, that resection of the rib is unnecessary, although there are some, as Lund,² who condemn this practice. He makes his incision in the ninth or tenth interspace in the posterior axillary line and always resects a rib. The choice of the anesthetic is important, because the patient is septic and respiration greatly embarrassed. Local anesthesia may be used in patients *in extremis*,

¹ Surgery, Gynecology, and Obstetrics, 1911, vol. xiii, No. 5, p. 572.

² Boston Medical and Surgical Journal, 1911, vol. clxv, No. 11, p. 394.

but it is difficult to cocaine the periosteum. He prefers ether to any of the general anesthetics, and discontinues it as the cavity is opened. A very much safer plan of anesthesia in these cases I have found a combination of local and nitrous-oxide anesthesia. Under infiltration anesthesia the incision is made down to the rib; the latter is resected under nitrous-oxide anesthesia, a step in the operation requiring but a moment or two. Cocaine is then injected into the parietal pleura and before this is opened the patient is quite conscious. Another method, and one which should overcome to a certain extent the dangers of pneumothorax, is the use of intratracheal insufflation and, if ether were to be used at all, I should prefer to give it in this way.

The patient is placed in the half-sitting position and turned somewhat to the opposite side, supported by a head-rest and pillows. After the rib is excised and the pleura opened, the pus is allowed to escape slowly so as not to cause traction on the mediastinum when the tension is released. The cavity is then explored with the fingers, the position of the lung noted, and adhesions between the lung and chest wall or between the base of one lung and the diaphragm broken up. A large rubber or collar-button empyema tube is inserted, and the wound closed about the tube by one or two sutures only. No more than one or two sutures should be used, because every stitch hole may be a channel of infection, and the more complete the closure of the wound, the more certain is it to become infected. The drainage tube should be removed when the lung has expanded, when the temperature has been normal for at least a week or ten days, and when the amount of discharge is small. Lund recommends the removal of large masses of fibrin, if present, as in cases due to a pneumococcus infection, and he does not hesitate to irrigate in cases in which this is difficult by other means, although it should be done with extreme caution. The various kinds of suction apparatus, such as placing a piece of rubber tissue over the end of the tube or the air-tight implantation of a catheter, to which a collapsible tube is attached, Lund has found unsatisfactory. Von Eberts,¹ on the other hand, prefers a suction apparatus, and describes the tube and dressing which he uses to prevent pneumothorax and establish a negative pressure in the cavity. Usually within twenty-four hours the exudate changes from a purulent to a seropurulent character, and the free serous discharge seems to get the infection rapidly under control; while in the subacute or chronic cases, where obliteration of the cavity is less rapid, suction should be continued as long as there is tidal air in the cavity; in fact, the presence of tidal air is an indication that the lung is capable of further expansion. Among the advantages of Von Ebert's apparatus are the infrequency of the dressings, the absence of odor, and the fact that one is able from day to day to note

¹ *Annals of Surgery*, 1911, vol. liv, p. 58.

the amount and character of the discharge. When the discharge has fallen below 10 c.c. in twenty-four hours, the tube is withdrawn, and when the cavity shows no tendency to become obliterated, he uses bismuth paste.

Bilateral empyema is seen most commonly in children, and only rarely after the thirteenth year of life. While a form of primary empyema is said to occur, pneumonia, either unilateral or bilateral, is the most frequent cause of the disease. The operation mortality is not high when drainage is established at the proper time. Both pleural cavities may be drained at the same time when the condition of the patient permits it; according to Fabrikant,¹ it is generally wise to wait a day or two before the opposite side is opened. As bilateral pneumothorax is not of itself dangerous in the united operation, it is better to drain both pleural cavities than to be content with drainage of one and aspiration of the other. Whether a formal resection or a simple intercostal incision is practised depends upon the site of the operation; if the interspace is wide, it will not be necessary to resect a rib.

DECORTICATION OF THE LUNG. In the treatment of chronic empyema it is not always necessary to remove the pulmonary pleura, but simply to break up the adhesions at the borders of the cavity between the parietal and visceral pleura. In the older cases the pleuræ are thick, firm, and rubber-like, but the parietal pleura is thicker and more difficult to detach. In these cases Lund² prefers to decorticate the lung through a vertical incision in the visceral pleura. He resects one and one-half inches of five or six ribs through an incision running upward and forward from the anterior end of the old drainage incision. In slitting up the thickened parietal pleura, the intercostal arteries may be wounded, but are easily seized and ligated. The visceral pleura, which is about a quarter of an inch thick, is carefully incised with a knife over the lower part of the lung. A finger is inserted through the incision and as soon as the soft surface of the lung is felt, it is swept to and fro with the pulp of the finger toward the pleura and pressing outward so as to cause the least possible damage to the lung. A pair of blunt-pointed scissors is inserted and the pleura slit up to the top of the chest and peeled off of the lung with the finger. Any adhesions between the lung and diaphragmatic pleura are divided. The lung retracts to a certain extent, but coughing favors expansion. The thick, pus-soaked dressing, if tightly applied, acts as an efficient valve. Change of dressing should be accomplished as rapidly as possible, and the tubes removed on the second or third day.

The treatment of severe forms of mediastinal emphysema by means of negative differential pressure was discussed in *PROGRESSIVE MEDICINE*, March, 1909. The chief disadvantage of the method is, first, that a

¹ *Deutsch. Zeit. f. Chir.*, Band cviii, p. 584.

² *Journal of the American Medical Association*, vol. lviii, p. 693.

negative pressure cabinet is required. It is applicable only to those cases in which the air goes directly from the thorax to the mediastinal tissues, and if the rupture is not found, the condition will immediately recur when the negative tension is removed. The condition of the patient is generally such that prolonged search for the rupture is impossible, so that some simple and rapid method of combating the spreading mediastinal and cellular emphysema is necessary. Tiegel's¹ plan was carried out in a case in which, following fracture of the ribs, a cellular emphysema extending to the neck and mediastinum occasioned a severe dyspnea. To meet the emergency, an incision was made in the neck, and by blunt dissection a passage was made down to the trachea and posterior surface of the sternum; a suction cup was then applied and continuous suction maintained by a water pump. Immediately the dyspnea was relieved and the cellular emphysema subsided. Attacks of coughing, however, increased the emphysema, and while this was readily controlled with the suction pump which was maintained for three days, it became necessary to drain the pleural cavity at the site of the fractured ribs. The emphysema at once disappeared, the wound in the neck healed by granulation, and the patient recovered.

Bronchiectasis and Abscess of the Lung. Bronchiectasis may be treated either by immobilization or by resection. If both lungs are involved, the condition is hopeless; if the process is diffuse, the lung should be immobilized; but, if confined to one lobe, either immobilization or resection may be considered appropriate. Immobilization may be effected in one of two ways—either by producing an artificial pneumothorax, or by an extensive resection of the ribs over the infected area, the so-called pleuropneumolysis of Friedrich. Robinson² is inclined to believe that in course of time the formal resection of the diseased lobe will be the established treatment, but at the present time we must be content with immobilization.

While spontaneous evacuation of a pulmonary abscess is a very frequent occurrence, one should not continue the expectant treatment beyond the point at which drainage may be resorted to without undue risk. From his experience in 16 cases, Robinson prefers to assume the responsibility of finding the abscess, rather than to postpone operation until the patient's resistance is so lowered as to add materially to the risk. Prolonged delay may result in a fetid empyema, the drainage of which, in the presence of an abscess, is always attended with a high mortality. The mortality of uncomplicated cases of acute abscess when the operation has not been too long delayed should be less than 8 per cent. The exploration of deep abscesses, in the absence of adhesions, is more safely performed under differential pressure. To avoid infection of the healthy pleura, a careful search should be made before

¹ Zentralbl. f. Chir., 1911, No. 12, p. 420.

² Boston Medical and Surgical Journal, vol. clxv, No. 11, p. 398.

and during the operation for an area of adhesions through which drainage may be established without soiling the pleural cavity.

The Surgical Treatment of Pulmonary Tuberculosis. Two years ago I¹ reviewed in some detail certain surgical procedures applicable to pulmonary tuberculosis. Since that time Friedrich² has published the results of more extensive operations upon the thoracic wall. The cases, almost without exception, were in the advanced stages of phthisis and the prognosis was most unfavorable, but in spite of the almost hopeless outlook, 14 of the number have been benefited for periods up to four years; the operative mortality—26 per cent.—is rather startling. He recommends the operation in patients between fifteen and forty, even though the opposite lung be involved, and the disease is in the active stage (fever, bacilli in sputum, etc.). The presence of metastatic areas in other organs, as the larynx, intestine, or bone, and of an anemia, he regards as contraindications. It is important to determine before the operation the condition of the mediastinum and pleura, for if a certain amount of rigidity is not present, the heart and vessels will become displaced and serious symptoms may occur. The degree of rigidity is best determined by careful Röntgen studies, and, when present, the most extensive operations can be carried out without fear of respiratory difficulties in the sound lung. Following resection of the ribs, the chest wall sinks in, the pulmonary cavities undergo collapse, the sputum diminishes in amount and the patient gains strength rapidly. The operation can be performed by means of an axillary incision going through the serratus, and folding the soft parts over the ends of the cut ribs. Care must be taken to avoid injuring the brachial plexus while resecting the first rib; in some cases, the function of the serratus may be interfered with.

The well-known fact that patients with passive congestion of the lungs of cardiac origin are relatively immune to tuberculosis, led Tiegel³ to study this question from the experimental standpoint. Under differential pressure, he opened the thorax of the animal in the fourth or fifth intercostal space and passed a fine silver wire around the pulmonary veins. The wire was twisted until the circulation was impeded and stasis produced. The wire did not cause ulceration of the vein walls in a single case, although hemorrhage from this complication was feared. The lungs, when examined in a few weeks or months, were swollen, pale in color, and decidedly dense in consistency. Microscopically, there was a marked increase of the connective-tissue elements, with thickening of the alveolar septa of the pleura. The effect of the stasis upon the development of tuberculous infection was shown in animals previously inoculated with tubercle bacilli. In the lungs

¹ PROGRESSIVE MEDICINE, March, 1910.

² Münch. med. Woch., 1911, vol. lviii, No. 39, p. 2041.

³ Arch. f. klin. Chir., 1911, vol. xcv, p. 810.

in a state of passive congestion, the tuberculous foci, while present, were small, encapsulated to some extent by connective tissue, and with little tendency toward caseation. The opposite lung, on the other hand, was the seat of advanced tuberculosis with marked caseation. While the immediate practical application of laboratory methods is not often wise, and this applies of course to Tiegel's work, every contribution throws a little more light upon the problem in question and at the same time often is more suggestive in the development of technique. Working along the same lines as Tiegel, Schumacher¹ found ligation of the branches of the pulmonary artery determined a connective-tissue proliferation in the lungs—a condition which favorably influenced the arrest of many pathological processes, notably tuberculosis and possibly bronchiectasis. He considers its possible value as a preliminary step in the extirpation of diseased areas or operable tumors of the lung.

The production of an artificial pneumothorax by air, oxygen, or nitrogen, still enjoys the support of a few clinicians, although it never seems to have gained a strong foothold with many of these who devote themselves chiefly to pulmonary tuberculosis. It is not, strictly speaking, a surgical procedure, but we have been in the habit of including it in our discussion of this problem. Rothschild² makes the following classification with respect to the indications: The procedure is regarded as safe in severe unilateral involvement, with no adhesions at all or only fresh ones; the procedure is permissible in severe unilateral involvement, with fresh or not too old adhesions on the other side; in severe involvement of one side, with slight involvement of the other, not including more than one-third of the lung, and without cavity formation; the treatment is of doubtful propriety in severe involvement of one side and cavity formation in the lower lobe of the other lung; and it is contraindicated when there is extensive involvement with cavity formation in the better side, with thick, firm and universal adhesions on the other side and severe complications in the other organs. Rothschild advocates the nitrogen injections even in cases of pulmonary hemorrhage when all other remedies have failed, but cautions against long compression if the process in the other lung seems to be spreading.

Postoperative Thoracic Infection. Comparing the conditions found in the abdomen with those in the pleural cavity, four points of difference are seen. In the pleural cavity there is a negative pressure, a rigid chest wall, a greater mobility of the viscera; there is a tendency to retract rather than to approximate and form adhesions. If we can, by artificial means, bring about conditions in the chest approximating those in the abdomen, we may hope for recovery after purulent infec-

¹ Arch. f. klin. Chir., 1911, vol. xcv, p. 536.

² Journal of the American Medical Association, October 28, 1911, p. 1424.

tions, even as is now the rule in the abdomen. Drainage of some sort must be established in order that thoracic operations may be more successful. One of the conservative steps in the healing of a suppurative process in the abdomen, is the early formation of adhesions. This principle may be transferred, by artificial means, to the thorax by approximating the visceral and costal layers of pleura and keeping them in apposition until adhesions shall have formed, thus preventing dead spaces in the pleural cavity. The infection arises to a certain extent by direct contamination from the opened viscera and from exposure of the pleura to the air. The pleura, if not too long exposed, will stand a severe contamination and the animal will live. The purulent exudate is induced, not by continuous contamination, but the result of contamination plus the presence of an area in which the resistance has been lowered. These general principles concerning pleuritic infection are based upon continued studies in the experimental field by Green and Janeway.¹ These observers, who have done much to put thoracic operations on a practical basis, attribute death to one or more of the following factors: (a) Physical factor—impairment of the respiratory mechanism, producing either complete or partial collapse of the lung; (b) physiological factor—fatigue of the respiratory apparatus; and (c) infections—due to local and general bacterial invasion. The difficulty of preventing, even in laboratory work under the most favorable conditions, either shock or infection, one or both, is the great barrier to the successful outcome of thoracic operations. The management of the intrathoracic pressure, which was once the great stumbling block, has been rendered feasible by the various positive or negative pressure, or by intratracheal insufflation. But as yet the research worker has not been able to operate through the open pleural cavity with that degree of safety which would warrant one in carrying out similar procedures in the thorax of the human subject without grave apprehension. The pleural cavity, for the reasons already given, cannot handle infections as well as the peritoneal, and the pleural membranes seem unusually susceptible to infection, even in what we would call clean cases.

Experimental Pneumectomy. Any operation which includes the resection of any considerable amount of lung tissue must be planned with full recognition of the fact that, because of its firmer structure, the human mediastinum cannot be displaced nearly to the extent possible in a dog. Obliteration of the remaining space in the thorax must thus be met almost wholly by resection of ribs. But such resection must be limited in its extent, else support of the vital organs in the thorax is lost. Therefore, excision of lung tissue in man should be limited to one lobe at the most, and in such conditions as local-

¹ *Annals of Surgery*, 1911, vol. liv, No. 4, p. 549.

ized bronchiectasis, a number of cures have followed this operation. Quinby and Morse,¹ who have carried on a series of experiments in animals, are disposed to believe that with our better grasp of the physiological factors, and our use of the intercostal incision with rib spreader and differential pressure, an exploratory thoracotomy may be performed with a reasonable assurance that the operation will be followed by no ill effects; with the aid of differential pressure we are able to restore the conditions to normal. They recommend the following technique: After etherization and the introduction of the tracheal tube, the patient is placed with the operative side somewhat higher than the other, the chest being accessible from the sternum to the angles of the ribs. Rigid asepsis is imperative, therefore towels should be fastened to the skin and thoracic muscles when these are incised. While the incision varies with the area to be exposed, it should begin well forward, and curving downward below the intercostal space, later to be opened, extend nearly to the angle. The intercostal muscles are next divided and the pleura opened. The ribs being forced apart by the spreader, the hand is introduced and the thoracic contents carefully and completely inspected. If the operation is prolonged, the parts should be covered with oiled China silk to prevent drying and loss of heat, as a prophylactic. Before closing the wound, the pleural cavity should be dry and free from blood clots. The spreader is removed, and the ribs, above and below the incision, surrounded by stout sutures placed about two or two and one-half inches apart. It is unnecessary to suture the pleura or intercostal muscles, but restoration of the other muscles and skin should be accurate and painstaking.

Injuries to the Lung. The tendency to operate promiscuously in injuries to the lung should not be encouraged—we should rather lean toward conservative treatment. In discussing this subject in *PROGRESSIVE MEDICINE*, March, 1911, we quoted statistics which prove conclusively that the mortality is higher and the number of infections greater in the operative series. We are not surprised, therefore, to find that in recent contributions, such as that of Bomhard,² this view is supported. Bomhard's material included 86 injuries, of which 42 were bullet wounds, 35 stab wounds, and 9 cases of rupture of the lung. The treatment consisted in absolute body rest, even to the extent of not moving the patient for examination, particularly if there was any bleeding. An injection of morphine was given immediately, an ice-bag applied to the patient's side, the wound carefully cleansed, partially sutured and covered with sterile dressings. In the event of an injury to other organs, as the heart or abdominal viscera, or in the event of severe hemorrhage of large vessels (internal mammary

¹ Boston Medical and Surgical Journal, 1911, vol. clxv, No. 4.

² Beitr. z. klin. Chir., 1910, vol. lxx, p. 252.

artery), an exception must be made and operation resorted to immediately.

Of the 35 stab-wound cases, 4 died of other complications; 29 were treated by conservative methods, and 2 by operation; 5 of the 29 died, 3 from hemorrhage and 2 from infection, whereas both of the operated cases recovered. The average time of treatment was twenty-one days; 42 cases of bullet injuries were treated, 8 died, 1 from sepsis and 7 from severe hemorrhage. The time for healing in these cases was longer, requiring on an average four or five weeks, and in 8 instances aspiration was necessary because of repeated hemorrhage and pneumothorax. There were 4 fatalities in 9 cases of rupture of the lung, the result of crushes or fracture of the ribs. Six times multiple fractures of the ribs were found, and three times depression of the entire thorax with fracture of the sternum. The author admits that some of the cases may have been saved by immediate operation, but, in many, the indications were not clear, and in others the condition of the patient did not warrant such measures. Interference should be regarded as indicated in the presence of (1) a severe primary hemorrhage with a rapidly increasing anemia, and in (2) secondary hemorrhage, the symptoms of which are not relieved by aspiration, but rather made worse, particularly if the heart's action is embarrassed by pressure. Extensive cellular emphysema, regarded as an indication by some writers, is not considered by Bombard, for this complication disappears spontaneously in many cases. The usual method of treating lung wounds, whether accidental or made by the surgeon, results in the formation of scars, so dense in some cases as to prevent the natural expansion of the lung. Gundermann¹ carried out a series of experiments to determine if methods could be devised to overcome this. He brought the divided ends of the lung together and then inserted a continuous suture in the pleura to maintain apposition. The operations were done under differential pressure, the best results being obtained by the use of Brauer's positive pressure method. The animals were killed in forty to sixty days; the autopsies did not show any diminution in the size of the lungs, the pleural cavity being filled. The sutured lobes were bright in color, contained air; the pleura was glistening, and only in the neighborhood of the sutured portions could a fine cicatrix be discovered. The union of the lobes was effected by a narrow band of connective tissue, but there was no attempt of the alveoli of one lobe to join with those of the opposite one. There were no dead spaces formed between the lobes, which soon were glued together by fibrin, and the intervening cicatrix acted as a barrier in preventing infection extending from one lobe to another.

In the analysis of the results of stab wounds of the chest treated at

¹ Beitr. z. klin. Chir., 1911, vol. lxxiii, p. 44.

the Massachusetts General Hospital, Murphy¹ found that, of the 42 cases treated in the past thirty years, only 4 died. Of these 4, not a single one seemed to be a proper surgical risk. There were 14 gunshot wounds, only 4 of which, looked at in the light of our present-day knowledge, would be regarded as suitable for exploration. The end results compare very favorably with any which have since been reported, even when the operation has been performed under the most modern technique. An analysis of the symptoms of these cases warrants emphasis being laid upon the following four points: (1) The frequent complaint of abdominal pain, even though the peritoneum was not affected; (2) the possibility of a serious hemorrhage from a wound of the intercostal artery, shown at autopsy in one case to have been the cause of death; (3) the great power of accommodation of the lungs to hemorrhage or pneumothorax, if the change comes on slowly; and (4) the relatively slight danger of fatal hemorrhage from collapse of the lung or its adherence to the pleura. The problem in these cases seems to resolve itself into the question of differentiating between shock and hemorrhage, and, if hemorrhage be present, whether the hemorrhage has or has not been arrested, and whether the patient's condition admits of operation. To sew up a tear which is not bleeding will do no good, for a collapsed lung protects itself, and the clot will absorb or be removed later as an empyema. Murphy sees that in these cases the conditions are analogous to crushes of the extremities. In the initial stage the symptoms are those of shock, and interference then is fatal. Reaction sets in from one to four hours, and there follows a period when operation is possible. Given a case of chest trauma which has rallied from the initial shock, and then proceeds to lose ground, exploration, with the idea of controlling hemorrhage, offers a greater chance of recovery than delay. At present, however, as a routine, rest, morphine, and the swathe will give us a lower mortality than anything like routine operative interference.

Intercostal Diaphragmatic Hernia. The following case of this rather uncommon condition was observed by Gerster.² The patient, aged thirty-eight years, received an injury three years previously, which fractured a rib and was followed by a painless tumor upon the left side. At no time had there been hemoptysis, dyspnea, vomiting, colic or any other untoward symptoms. There had been no progressive enlargement of the tumor since its first appearance. The swelling was the size of half an apple, situated in the anterior axillary line, near the free border of the rib. The swelling enlarged upon coughing, was entirely reducible through a gap in the thoracic wall between the eighth and ninth ribs. The swelling remained reducible except upon straining

¹ Boston Medical and Surgical Journal, vol. clxv, No. 11, 1911.

² Annals of Surgery, 1911, vol. liv, p. 538.

or coughing, and could also be made to appear by pressure upon the abdomen; at times the reduction was accompanied by a gurgle. The patient did not desire operation, and a belt or supporter was not advised because such an appliance might readily lead to strangulation.

Herniæ of this type follow wounds or contusions along the free costal border and have been known to occur after strains, in which case the ribs may not be fractured. They have been observed usually in the anterior parts of the sixth to the tenth left interspaces inclusive. Trauma in this region usually causes adhesions of the phrenic and parietal pleuræ, with consequent obliteration of the costophrenic sinus. In this zone, the diaphragm and intercostal muscles lie close to each other in almost the same plane; hence rupture of tissue at this point favors the formation of an intercostal hernia.

The subjective symptoms may be *nil*; or pain and digestive troubles due to adhesions may develop. The objective symptoms are those of other herniæ. Increase in size upon respiration may not be obtained, except in certain positions. Reduction is easily accomplished in most cases, but may be prevented by adhesions. The consistency of the swelling and likewise the percussion note depend upon the contents of the hernia, that is, whether omentum, gut, or stomach. Over herniæ which contain part of the stomach, typical intermittent splashing sounds are heard when the patient drinks. Peristaltic borborygmi may be obtained over a hernia containing gut. The *x*-ray is of great service in the diagnosis even without the aid of bismuth; much accurate information can be obtained regarding the part of the digestive apparatus contained in the hernial sac. Differential diagnosis from such conditions as subcutaneous emphysema, hematoma, or pneumocele following a contusion, should not be difficult. Emphysema gives a characteristic crackle and is usually diffuse; a hematoma does not change its size with respiration. A pneumocele lies higher than the usual intercostal diaphragmatic hernia, diminishes in size on respiration, gives a normal percussion note, crepitation upon reduction, and the breath sounds should be normal.

The *treatment* consists in the application of a suitable bandage or truss, or in operation. Operative measures are often difficult because there is no true sac, and because of the many adhesions present. The best plan is to dissect close to the neck of the hernia and gain an entrance into the free peritoneal cavity when reduction of the contents can be done more easily. Closure of the opening may be difficult because of the inelastic cicatricial ring formed by the fusion of the diaphragm and thoracic wall. In such cases, the ribs above and below may be approximated to obliterate the space through which the hernia formerly protruded, or a plastic closure may be resorted to, using fascia, peritoneum, or part of the latissimus dorsi.

THE ESOPHAGUS

Stricture. In the case of benign stenosis of the esophagus, gastrostomy indirectly affords relief by providing a means of maintaining nutrition while the stricture is undergoing treatment, and by providing an avenue for retrograde dilatation or for the practice of Abbe's string-saw, or Ochsner's double catheter methods. But apart from all this, the operation seems to have a very positive direct influence over the cicatricial stricture, just as it does over one of syphilitic or tuberculous origin. So long as pulpy, semisolid, or even a portion of solid food can be swallowed, dilatation or tubage should be practised; but when the point is reached where the patient can only swallow liquids, Eastman¹ thinks we are slavishly following the teachings of pre-aseptic days if we do not resort at once to a gastrostomy, not only because of its indirect usefulness, but also because of its curative value *per se*.

While it is true that, in many cases of esophageal stricture, a radical operation may be required, there are other methods which have yielded equally good results. We are under very great obligations to Plummer² for his several contributions on esophageal lesions, notably that on cardiospasm and for the ingenious instruments which he has added to our equipment. In his recent article he calls attention to the safety with which instruments may be employed, providing we use a silk thread as a guide. The patient swallows six yards of silk thread; this passes down through a sufficient number of coils of intestine to prevent its withdrawal on being pulled taut. With the whalebone staff and olive passed on the thread we may locate pockets, determine their depth, measure the diameter of the stricture, practice divulsion and estimate the rigidity of the esophageal wall at the site of the stricture. Guisez³ prefers to use the esophagoscope in the passage of sound. He leaves the sound in place for a few hours, and gradually increases the size of the instrument until the stricture is fully dilated. This measure was effective in 44 out of 54 cases; in the remaining 10, it was necessary to resort to a gastrostomy.

The lumen of the stricture may become so small as to finally be impassable even to a string, and in a case of this description Fischer⁴ resorted to a rather formidable procedure. While the patient died in twenty-four hours from pulmonary congestion, the operation was not difficult from the technical standpoint and required but forty-five minutes. Fischer does not hesitate to recommend it as an appropriate measure for those cases which would otherwise be resigned to lifelong

¹ *Annals of Surgery*, vol. liii, No. 3, p. 318.

² *Journal of the American Medical Association*, vol. lvi, No. 8.

³ *Bull. de la Soc. de Pédiatrie*, January, 1911, vol. x, xiii, No. 6.

⁴ *Surgery, Gynecology, and Obstetrics*, 1911, vol. xii, No. 5, p. 476.

feeding through a gastric fistula. The operation was done on a boy, aged three years, under Meltzer-Auer continuous insufflation, for an impassable stricture which began at the tracheal bifurcation and ended 1.5 cm. above the diaphragm. By pushing the well-distended lung away from the diaphragm through incisions in the seventh and eighth intercostal spaces, the esophagus was exposed and dissected free from its bed. Traction was then made on the organ by a loop of gauze passed around it and a pair of forceps pushed through the layer of diaphragmatic pleura and peritoneum, and the peritoneal cavity opened. The stomach was now carefully pulled into the thoracic cavity until a point was reached about 7 cm. below the point of entrance of the esophagus. The pleural cavity was packed off with silk handkerchiefs, the stomach was opened 3 cm. below the cardia and a ureteral catheter passed through the stricture and on out through the mouth. A pair of long curved dressing forceps was now inserted into the gastrostomy opening, which had been made at a previous operation and the lower end of the catheter caught and pulled through the gastric fistula. The incision in the cardia was then sutured, the esophagus fastened to the diaphragmatic ring, and the thoracic wounds closed.

Cardiospasm. Many cases of cardiospasm have been relieved by forcible dilatation in one way or another, notably by the method of Plummer, and while Mayer's¹ case turned out successfully and is a tribute to his skill and to his familiarity with the application of positive differential pressure, we should hesitate to indorse so formidable a procedure except under very exceptional circumstances. In the case referred to, a preliminary gastrostomy had been done and attempts to dilate the cardia through this opening were unsuccessful. Under positive differential pressure, the lung was exposed and pushed away from the mediastinum, diaphragm, and aorta. A large sac was found above the cardia. The overlying pleura was split, the pneumogastric nerves separated from the esophagus on either side and a double esophagoplication performed, care being taken not to penetrate the esophageal wall and not to include the pneumogastric nerves. The esophagus was replaced and the wound closed. The patient was able in one month's time to swallow solid food and progressively improved until all the symptoms were relieved. Recovery was attributed partly to the forcible separation of both pneumogastrics from the esophagus, the tearing of many tiny nerve fibers that enter the muscularis of this organ, and partly to the obliteration of the pouch.

Esophagoplasty. Some very extraordinary results have been obtained in the repair of defects left by the removal of portions of the esophagus, the seat of malignant growths. Lane² restored the continuity of the upper portion of the esophagus with a tube constructed from a strip

¹ Journal of the American Medical Association, 1911, vol. lvi, No. 20, p. 1437.

² British Medical Journal, January 7, 1911, p. 16.

of skin cut from the neck, retaining an attachment for its blood supply. After the union between the esophagus and skin had taken place, the attachment was severed. A tube was retained in place for feeding purposes until union was secure. The patient was unable to swallow food, but acquired the habit of swallowing her saliva. At the subsequent post mortem, a recurrence was found in the left side of the neck, but the implanted tube of skin did not differ in appearance from the normal esophagus. While the patient died of recurrence, the operation demonstrated the feasibility of substituting the skin to repair the defect, providing the portion removed is not in too close proximity to the upper aperture of the larynx.

Lexer¹ has combined the use of skin for the cervical portion of the newly formed esophagus with the use of the intestine for the remainder. In 2 cases operated upon in 1903 and 1904, the wounds healed perfectly and deglutition was perfect. Lexer next endeavored to form the entire esophagus from the skin flaps; his incision began one inch above the sternal notch, extended 6 cm. to the left of the median line and three fingers' breadth below the costal margin back to the median line. The flap was dissected free, and rolled into a tube of the caliber of one's finger. The skin of the chest was then undermined so that it could be united over the tube. The tube was sutured to the stomach about one month later, a perfect anastomosis resulting, but, unfortunately, the carcinoma recurred before an anastomosis between the esophagus and pharynx could be effected. In another case, Lexer used a loop of jejunum to replace the esophagus, and the result has been particularly good. The patient is able to swallow and has remained in the best of health for eight months.

Esophagoscopy. Fully 90 per cent. of smooth foreign bodies lodged in the esophagus can be dealt with successfully by the use of the esophagoscope. It is obsolete surgery in the minds of some to open the side of the neck in order to remove a coin or a button. The majority of rough foreign bodies can be removed by the esophagoscope, but if not readily extracted, the attempt should be abandoned and resort had to external incision. We must remember however, that the use of the esophagoscope is not without danger, chief among which, as Mosher² points out, are rupture of an aneurysm, perforation of the esophagus, and sloughing of the esophagus from pressure of the tube. The first danger ought to be easily avoided, as no examination should be undertaken if there is the least suspicion of aneurysm. Rupture of the esophagus should never occur because the instrument should not be advanced unless the examination sees the patulous esophagus ahead. Sloughing from pressure is most apt to occur when the lumen is narrow opposite the cricoid cartilage; to avoid this, one should sub-

¹ Münch. med. Woch., 1911, vol. lviii, p. 1548.

² Boston Medical Journal, 1911, vol. clxv, No. 11, p. 401.

stitute an instrument of smaller caliber. The usefulness of the esophagoscope in the diagnosis of lesions of the gullet suggested its application to gastric lesions. Janeway and Green¹ have examined a large number of cases in which both organs were involved, and among these were fourteen lesions of the stomach. They were able to recognize carcinoma of the cardia in an early stage and remove a small piece of the growth for microscopic examination. Of 12 cases examined, they failed to find the lesion in 2, where the tumor was situated in the pyloric end of the stomach. They prefer to make the examination under local anesthesia; if it occasioned so much discomfort as to necessitate a general anesthetic the examination was not so satisfactory.

Esophageal Fistula. Esophageal fistula in the cervical region may be due to stab or bullet wounds, to crushing injuries, to perforation of the esophagus by instruments or foreign bodies, and to ulcerative processes. No matter what the cause, these fistulae should always be regarded as of grave moment, and their closure is often attended with many difficulties. In v. Hacker's² case, the fistula developed after the removal of an impacted foreign body and a subsequent infection. A gastrostomy was performed but to no avail, and an unsuccessful attempt was made to close the fistula, as the wound became infected. One year after the accident occurred another attempt was made. The opening was closed by a purse-string suture in the submucosa, by careful suturing of the muscularis and by reinforcing the suture line with a portion of thyroid gland transplanted for the purpose. The result was entirely satisfactory.

¹ Surgery, Gynecology, and Obstetrics, 1911, vol. xiii, No. 3, p. 245.

² Beitr. z. klin. Chir., 1911, vol. lxxiii, p. 352.



INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA

By JOHN RUHRÄH, M.D.

THE subject of infectious diseases has received the same large share of attention that it has in the past, and, if anything, the number of individual contributions made to the literature on this subject have been greater than ever. There is a general feeling that, for the present at any rate, the advances that are to be made in medicine and in sanitation are going to come through a better understanding of the infectious diseases, and it is with this end in view that countless numbers of investigations have been undertaken. These studies have been made on the causation of various diseases, the problems of the transmission, the prophylaxis and the treatment. It is not possible, in the amount of space allotted me, to note all of the contributions that have been made, but most of those of any great clinical importance will be found abstracted below.

The centre of attention varies from year to year. A few years ago cerebrospinal fever was the chief disease occupying the minds of both investigators and clinicians; last year poliomyelitis was the most talked of affection, and this year a number of different maladies have shared honors in this direction. The interest in tuberculosis continues in a most remarkable manner, and the most notable publication of the year in regard to this disease is the Report of the Royal Commission of Great Britain, dealing with the question of the transmission of bovine tuberculosis to man. One of the most notable laboratory advances that has been made is the more widespread use of antiformin in the demonstration of the tubercle bacillus for diagnostic purposes, while Arneeth's method of counting the polynuclear cells is of considerable interest from the standpoint of prognosis.

Typhoid fever, as usual, continues to interest the medical profession, and the striking demonstration of the value of antityphoid vaccination in the recent army manoeuvres in Texas is the one which stands out above all others. Antityphoid inoculation may be regarded as an accepted fact. The macroscopic agglutination test of Bass and Watkins, if confirmed, ought to revolutionize the present method of diagnosis. The study of typhoid bacillus carriers, and also the study of

animal carriers of typhoid, is of great practical interest in connection with the prevention of this disease. A new interest has been aroused in typhus fever through the researches of Nicolle, who has demonstrated that European typhus is transmitted by the bite of the body louse, just as Ricketts and Wilder demonstrated this for tarbardillo or Mexican typhus.

Two diseases heretofore not classed as infectious have been studied from a new point of view, and these are chorea and pellagra. So far there has not been a great deal of evidence brought forward in regard to the first disease, although there is a widespread impression among those of us who have to deal with it that it is either a specific infection, or, perhaps, what is more probable, that it is a symptom of the effects of various toxins upon the nervous system, so that it is highly probable that chorea will be found to be not a specific infection but a symptom of infection with any one of a number of different organisms. Pellagra, which has so long baffled clinicians and which, through the interest in it in America, has become a very vital topic, has been placed in the list of infectious diseases by Sambon and others who believe that it is transmitted by a species of gnat (*simulium*). Whether this is true or not will have to be demonstrated by further work.

The progress of the work of the Rockefeller Commission for the eradication of the hookworm is a matter of great importance, and one which will be watched by the profession of the United States, particularly in the southern states, with great interest. This is perhaps one of the largest hygienic measures ever undertaken. The work as far as it has progressed is noted below.

Beck has suggested a new means of administering ipecacuanha in amebic dysentery, which ought to render the use of this heretofore disagreeable treatment perfectly feasible in almost all cases. He has avoided most of the disagreeable symptoms attending the administration of ipecacuanha by the use of Einhorn's duodenal tube.

There has been considerable advance made in the study of leprosy, particularly along the line of the methods of diagnosis, and Duval has not only succeeded in cultivating the bacillus, but in transmitting it to the monkey. This, let us hope, will be the first step in finding some better means of treatment.

Measles, which has so long been neglected by the investigators, has been studied by Anderson and Goldberger, and they have succeeded in transmitting the disease to monkeys, and their experiments have brought out several very interesting things in connection with this disease.

A step has been made in the study of scarlet fever, and it has been transmitted to chimpanzees and also to the lower monkeys by Landsteiner, Levaditi, Prasek, Bernhardt, and Cantacuzène. They are of the opinion that the streptococcus has nothing to do with the actual

causation of the disease, and that the real organism of it is as yet undiscovered.

Considerable advance has been made in our knowledge of poliomyelitis by the studies of Flexner and Lewis and others, the information so gained consisting chiefly of a more accurate knowledge of the characteristics of the virus, for the details of which the reader is referred to the abstracts given below.

Asiatic cholera has also been in the public eye, and a good deal has been learned about the diagnosis of the disease, and particularly about cholera carriers.

The opening of the tropics through modern sanitary methods, the occupation by white men and the greater traffic have led to a greater interest in the study of tropical diseases, among which may be mentioned Bilharziasis and oriental sore, and what is of great importance, the discovery of the endemic Malta fever in the goat farms in Texas, and also in those living about farms. Various diseases which affect animals and which may occasionally be transmitted to man have been studied with considerable zeal.

In connection with the prevention of infectious diseases, a considerable amount has been accomplished, but much remains to be done in this direction. The first step is the extension of the census to cover practically all of the infectious diseases, and all of the territory of the United States, for without an accurate knowledge of the amount and distribution of disease nothing like an adequate campaign can be planned. The second step is the education of physicians in the prophylaxis, diagnosis, and treatment of various transmissible diseases, and the education of the laity along the lines of prevention. Systematic medical inspection of schools, factories, and of all other places in which groups of people are gathered together should be undertaken, and greater effort should be made for the recommendation of isolation and proper treatment of cases of transmissible diseases so discovered. The last step in the eradication of infectious diseases is in securing unpolluted water supply, not only in cities, but for small towns and country residences; the prevention of soil pollution, and the spread of diseases that are carried in discharges should be obtained through proper disposal of sewage, and this must extend throughout the length and breadth of the land. The suppression of dust, both in buildings and cities, will do much toward rendering life more bearable, and lessening the number of infectious diseases transmitted by aerial means. Finally, the recommendation that, as many diseases are transmitted by vermin and small animals, the systematic extermination of flies, fleas, bed-bugs, lice, rats, and mice should be undertaken. The results obtained by Gorgas, first in Havana and subsequently in the Canal Zone in Panama, should convince the most skeptical of the value of modern methods of dealing with the eradication of preventable diseases.

House Quarantine. Cohen¹ calls attention to the control of contagious diseases, particularly in cities, which consists in recognizing the patient as the original source of infection, that the patient and contacts are the means of spreading the infection, and that houses and objects, such as bedding, etc., may harbor and give off infection.

The difficulty in maintaining house quarantine is due to a number of different things, one factor being marked poverty, and the overcrowding which it brings with it; the second, the ignorance and superstition regarding health laws; third, carelessness on the part of the semi-intelligent; and fourth, the assertion of self interest against community interest on the part of some of the wealthy families and individuals in the community.

Cohen believes that the greatest need is personal inspection of quarantine premises, every day, or at least every other day, to see that the inmates stay in and the outsiders are kept out. Cohen also believes that the education of the people, in regard to quarantine and the nature of infectious diseases, will do more than anything else, and this, coupled with sufficient hospitals for infections and sufficient regulation of the quarantine, will bring about a great reduction in the number of cases of scarlet fever and diphtheria.

The Medical Inspection of School Children. I have called attention before to the great importance of preventing the spread of infectious diseases by having efficient isolation of patients who are ill. All other means, particularly for the diseases of childhood, are to be considered as of minor importance. What may be accomplished by means of medical inspection, is well shown in the report for 1910 of the Chicago schools, where 820,655 examinations were made of school children suspected of having communicable diseases. As a result of these examinations, 14,653 pupils were excluded from school—708 with diphtheria, 1004 with measles, 397 with German measles, 579 with scarlet fever, 1010 with chickenpox, 1128 with mumps, and 298 with whooping cough. This means the keeping out of the schools of that many foci of infection, a point which cannot be overestimated in preventive medicine.

Syphilis and Gonorrhea as Epidemic Diseases. Both of these diseases will be considered in the September number of *PROGRESSIVE MEDICINE*, and this is not the place for any extended mention of anything in connection with them, and yet it may not be entirely out of place to call attention to the fact that, in recent years, both the medical profession and the laity are coming to take a more common-sense view of the prevention of the incidence of these diseases and the train of suffering which they leave in their wake.

A committee of fifteen prominent New York citizens, after having

¹ *Journal of the American Medical Association*, December 17, 1910.

made an investigation of the social evil, comment in the following manner: "Venereal diseases are the most serious that menace public health, and no less energetic measures should be taken in stamping them out than are employed in checking the ravages of other serious contagious diseases. . . . These diseases, apart from all this, impair the industrial efficiency of the individual, and increase the chance of his becoming a burden upon society. . . . It is the duty of the community to do everything in its power to disembarass itself of venereal diseases."

This sums up in a few words the attitude which should be taken. There have been an enormous number of articles written in recent years on this subject, viewing it from all points, and one calling attention to these diseases as epidemic diseases is that of Schamberg,¹ who takes up the question of the amount of syphilis and gonorrhea present, and of some of the remedies which may be used in combating these evils. In the same journal is also an article by Gates² dealing with the prophylaxis of venereal disease. Among the things that may be mentioned which are of special importance, is the improvement of material conditions of the wage-earners, the supplying of a better class of places of amusement, and the prevention of overcrowding in tenement houses. A great deal has been done of recent years in the education in sex hygiene, both for children and older individuals. The abolition of the common drinking cup will also probably help some, as will the coercive hospital treatment of venereal patients, who, of their own accord, will not take the proper care to prevent the spread of the disease. The question of legislative measures is one about which little can be said at the present time, as we all know that man cannot be made moral by the passage of laws. It is quite possible that the registration of these diseases in certain instances would be a good thing, and physicians should be legally free to report cases to employers without being liable for damages, and this would interest particularly those employing cooks, waiters, and nurses. Another feature of importance is the increasing hospital accommodations for venereal diseases. In most communities there is a certain amount of opposition to this, and in almost all cities the number of hospital beds open to patients with syphilis and gonorrhea is much too small. As a result, prostitutes, who would often willingly be treated, freely ply their profession in order to gain a living. The last point to be noted is the advantage of teaching prophylactic measures similar to the methods used in the Army and Navy, which have been attended with such remarkably good results. In general, this meets with considerable opposition from various sources on moral grounds, but the question is one of the prevention of diseases, and should be dealt with from the same standpoint as that of any other contagion.

¹ Pennsylvania Medical Journal, January, 1911, p. 247.

² Ibid., p. 255.

The Relation between Acute Infectious Diseases and Arterial Lesions. Frothingham¹ has made a study of the arterial system in the various infectious diseases, part of the work being done upon human tissues, and part the result of experimental lesions in animals.

In certain of the acute infectious diseases there may be diffuse arterial lesions as the result of toxic action, while in other infections no arterial lesions are found. In healing, some of the lesions leave behind a permanent sclerosis in the arterial system. Toxins are capable of causing arterial lesions locally at the site of the active process of the infectious disease, or the changes may take place in some distant organ, particularly the kidney, as so often happens in scarlet fever. Frothingham found that of the acute infections, diphtheria, pneumonia, tuberculosis, typhoid, and glanders seem most constantly to have associated with them general lesions in the arteries.

The Conglutination Reaction in Streptococcus Infections. Swift and Thro² have made a study of the conglutination reaction with various strains of streptococci. This reaction was described in 1906 by Bordet and Gay. They found that there was a colloidal substance in beef serum heated to 56° C. which has the property of causing a characteristic clumping and increased lysis of red blood cells when treated with a heated specific hemolytic serum and fresh complement.

Bordet and Streng later named this substance "conglutinin." Streng found that a typical clumping was produced by the mixture of bacteria, fresh complement, conglutinin, and a specific immune serum from which the agglutinins had been removed by absorption, and that the reaction took place as well with bacteria killed by heat or 0.1 per cent. solution of formaldehyde, as with live organisms. They were unable to get any better results with the various strains of streptococci than with the agglutination reaction. They are of the opinion that, while the conglutination and agglutination reactions are specific for streptococci, they are not specific for individual strains. Their experiments are not of a sufficient number to reach definite conclusions upon this point.

The conglutination reaction has also been applied to the study of dysentery in infants by Lucas, Fitzgerald, and Schorer.³ They found it more sensitive and specific than the agglutination or fixation test.

A Simplified Opsonic Index. This is not the place to make extended comment upon laboratory methods, and yet one word on the method of Crane⁴ may not be out of place.

The opsonic index, as suggested by Wright, has too many difficulties and objections for general use. Crane has suggested a method of

¹ Archives of Internal Medicine, August, 1911, p. 153.

² Ibid., January, 1911, p. 24.

³ Journal of the American Medical Association, 1910, vol. liv, p. 441.

⁴ American Journal of the Medical Sciences, May, 1911, p. 724.

diluting one part of the whole of nine parts of the germ suspension in an isotonic salt solution in a leukocyte pipette, and to rotate it in a special clockwork at the rate of three times a minute in a thermostat at 38° C. for fifteen minutes. Smears may then be made and stained so that, with the exception of the fifteen minutes in the thermostat, the process does not differ materially in point of time from a leukocyte count. Crane believes that if the results which he has obtained can be confirmed by other observers that it will place a new laboratory method at the disposal of all laboratory workers.

Experimental Investigations in the Transmission of Protozoa by the Bed-bug. Sangiorgi¹ has carried out some experiments in the Hygienic Institute of the University of Turin upon this subject, using white mice and trypanosomes of nagana. He found that if the bed-bugs were allowed to feed upon infected mice and were then placed upon healthy mice, that the parasites could be transferred from one animal to the other through simple mechanical infection. He also determined that the intestinal canal of the bed-bug (*Cimex lectularius*) was not a favorable site for the development of the trypanosomes, that most of them lost their power of movement inside of twenty-four hours, but retained their morphological characteristics for some three or four days, and then apparently underwent degenerative changes. They did not, however, lose their virulence quite so soon, for even after three or four days the contents of the abdomen of the bug injected subcutaneously were capable of infecting the mice, symptoms appearing after a comparatively long incubation period of from eighteen to twenty-six days.

The bed-bug as a means of transferring infectious diseases has been a subject of considerable discussion, some investigators believing that such diseases as anthrax, plague, cholera, etc., could be transferred by the bug, other observers believing that it is not possible. Carmichael believes that the bug is responsible for the transmission of leprosy. The subject is worthy of further study and investigation, and it would seem exceedingly probable that certain of the parasitic diseases could be transmitted by this ubiquitous insect.

An Attempt to Make Local Immunity Useful in Practice. Von Wassermann and Ledermann² have reported their investigations on a subject which will probably open up a new field of practical research in immunity.

It will be remembered that there are two kinds of immunity, one in which the reaction is general and all the tissues are affected, and a local immunity in which there is a limited area only affected. This was first shown by Ehrlich in reference to certain poisonous albuminous substances derived from plants. Römer later showed that the conjunctiva could be immunized for these poisonous substances and various

¹ Centralblatt für Bakteriologie, December 17, 1910, p. 81.

² Medizinische Klinik, March 26, 1911, p. 479.

other observers succeeded in producing local immunities, among which may be mentioned the work of Block and Basel who succeeded in rendering certain parts of the skin of mice immune to favus.

Staphylococcus infections of the skin seem to offer the most fruitful field for this work, and led von Wassermann to prepare a substance which he has named "histopin," which was made by shaking in a special apparatus staphylococci with water, afterward centrifugalizing the mixture, and so obtaining the solution which contains the immunizing material. At first this could not be kept, but, by the addition of a gelatin solution and 2 per cent. of phenol, he succeeded in getting a stable solution. This solution is sterile and produces no irritation and no febrile reaction. It can be used for weeks in as large quantities as may be desired on the skin of the patient in order to produce a local immunity.

Ledermann has used this in furunculosis and impetigo due to staphylococcus infections, and found that it was not only useful in very superficial infections, but also affected the deeper tissues, and was useful in protecting against a recurrence of the disease. A 25 to 50 per cent. salve of this extract caused a rapid healing of impetigo contagiosa due to the staphylococcus, and also of deeper furuncles which were first opened and the ointment used in connection with Bier's hyperemia. This is a line of practical investigation which ought to be worth following up, but it is impossible to form any conclusions on the results of a few experiments. It would seem, however, to offer a method of treatment certainly for resistant skin infections.

Transmission of Bacteria by Flies. Orton and Dodd¹ have done a very pretty piece of work on this subject, with special relation to an epidemic of bacillary dysentery that occurred at the Worcester State Hospital, Massachusetts, 1910. The epidemic consisted of 136 cases, the incidence was gradual and spread scatteringly and irregularly, no one ward or set of wards suffering in marked disproportion. They thought that the disease was transmitted by flies, and that, in this particular instance, they probably had become infected in the laundry in which there is one room with a special washing machine used for washing bedding and clothing soiled with feces.

In order to make a study of the possibility of flies carrying bacteria, cultures of the *Bacillus prodigiosus* were exposed in the laundry in this special room, and flies were trapped in various parts of the institution in screened wards and rooms, and these flies were found to contain the *Bacillus prodigiosus*. The flies were caught between two and six days after the exposure of the cultures.

As a result of their studies they conclude that it was practically impossible to keep the flies from fecal material and food in most of the

¹ Boston Medical and Surgical Journal, December 8, 1910, p. 863.

large insane hospitals, and that the best prophylaxis against fly-born epidemics is in cleaning up the breeding places of the fly, to reduce its numbers, or to eradicate it. The house-fly's egg to adult cycle is ten days, so that a thorough cleaning up must be done at least once a week during fly season.

The Prevention of Flies in Garbage and Manure. The fly as a carrier of germs of disease and also of bacteria which cause milk and other foods to spoil is coming in for its share of consideration, and the following suggestions¹ may prove useful:

To prevent garbage from becoming a breeding place for flies, common kerosene mixed with crude carbolic acid has been found most effective. The mixture should be made with one part of the acid to 100 parts of kerosene, say 1 ounce of the acid to 1 quart of kerosene. This mixture sprayed lightly in garbage cans acts as a repellant, as flies will not settle on, nor feed upon, material that is impregnated with the odor of carbolic acid. Sprayed upon garbage in which flies have already deposited their eggs, it will destroy both the eggs and larvae.

For treating manure to which flies have had access, a solution of sulphate of iron—copperas water—made by adding 1 pound of the sulphate to a gallon of water, has been found effective. A solution of this strength, it is claimed, kills the maggots and does not affect the value of the manure for fertilizing purposes.

The fight on the fly must be waged mainly along the lines of abolishing the places in which it breeds. No propagation means no flies. All manure from stables should be kept in boxes or receptacles so screened that flies cannot possibly have access to it. As it is estimated that 80 per cent. of all flies are bred in stable manure, the importance of these suggestions is apparent.

Schuermann's Color Test for Syphilis. Owen² has made some observations on the color test for syphilis. This test was suggested by Schuermann, and consists in mixing together 10.1 c.c. of suspected serum and 3 or 4 c.c. of normal salt solution, adding 1 drop of perhydrol (hydrogen peroxide—Merck). This is well shaken, and 0.5 c.c. of the modified Uffelmann reagent is added. According to Schuermann, normal serums cause only green or greenish-blue color, the mixture remaining uniformly clear. With syphilis the color is dark brown-black, and the mixture becomes opaque. (Modified reagent referred to consists of phenol, 0.5; 5 per cent. solution of ferric chloride in water, 0.62; distilled water, 34.5 parts.)

Owen was unable to confirm these results, and unsatisfactory results have been reported by Clark, Braunstein, and others, so that for the present the color test for syphilis, while it would probably be an ideal one, is not of much practical value.

¹ Bulletin of the Department of Health, Chicago, May 6, 1911, p. 4.

² Archives of Internal Medicine, January, 1911, p. 52.

Fungus Infection of the Finger Nail. Low¹ is of the opinion that fungus infection of the finger nails is more common than is ordinarily supposed. The cases, as seen clinically, fall in one of three groups. (1) Ringworm of the nails, (2) favus, and (3) fungus infection of unknown origin. Of these the ringworm is the most important, and a curious fact is that it almost invariably occurs in women. It may occur at any age, but the youngest case that Low saw was eleven years of age.

It is a well-known fact that children with ringworm very exceptionally have the nails affected. This is probably due to the fact that it does not cause itching, so there is little or no tendency to scratch. The source of infection in most instances cannot be determined. Occasionally it may be traced to some case with which the patient is associated. As a rule, it lasts a long while, varying from three weeks to seven years, with an average of about four years. Various numbers of nails may be infected, usually from one up to seven, no one nail being infected more than the others.

The diagnosis is comparatively easy, as the appearance of the nails is rather constant. Splitting up and splintering of the free margin of the nail is quite characteristic of the disease, but as the patients usually keep the nails clipped and free from any loose parts, this may not be noted. The color varies from a yellowish-white to a brown or black color, and in many instances there are definite zones presenting different colors and appearances. The end of the nail is apt to be undermined and dark in color, softer than normal, and above this there is a zone of light yellow longitudinally striped with darker lines. Further up there is a peculiarly dark yellowish-red zone. The diagnosis is easily confirmed by the microscopic examination. Pieces of the nail may be scraped off, put in 6 per cent. liquor potassæ, heated gently for a few minutes, and then examined. Cultures can be made if desired on Sabouraud's medium.

The treatment is more or less unsatisfactory because it must be carried out for a considerable period of time, and patients are apt to be lax in this regard. Various methods are suggested, one of keeping a rubber finger-stall on the nail and using white precipitate ointment twice daily. The softened nail must be scraped away every day, and other antiseptics may be applied. Norman-Walker suggests applying Fehling's solution to the nail on gauze and covering it with a finger-stall, leaving it on for a day or two. At the end of this time the whole nail is so soft and pulpy that it can be removed by forceps. After this is done a continuous dressing of copper sulphate, 10 grains to the ounce, is used.

In the favus cases, the infection usually takes place from the scalp, and the diagnosis is made by the presence of the disease in the scalp by finding the fungus microscopically, and the fact that the fungus tends

¹ Edinburgh Medical Journal, February, 1911, p. 121.

to accumulate under the nail and raise it up. The same treatment as suggested for the ringworm may be used.

Other fungi may be occasionally met with, and Low reports one such case in which the nails had a greenish-yellow color. The microscopic appearance of the fungus in cultures was not different from those described.

The Microscopic Examination of the Blood for Bacteria. Fried and Sophian¹ have made an experimental study on animals of the value of examining the blood for various bacteria, and they found that they were able to demonstrate bacteria in the blood cultures in 97 per cent. of their cases. In about 9 per cent. of the cases examined, bacteria were demonstrated in the blood which had been found sterile by means of blood cultures, and this point is one which they expect to study still farther, as it may mean that the methods now in use are faulty. They suggest that the microscopic examination of the blood may be of service in case of sinus thrombosis and osteomyelitis for the purpose of making a rapid diagnosis of the presence of bacteria in the blood. In order to obtain reliable results, it is exceedingly important that all fluids and stains be free from bacteria, and they should be filtered before using. With the methods now in vogue, the examinations have not succeeded in the cases in which the presence of Gram-negative organisms were suspected. They also suggest that the microscopic examination of sedimented bouillon cultures may be of value in making an early diagnosis in some cases of typhoid fever.

Actinomycosis of the Lungs. In 1899, I made a collective report of the cases of actinomycosis that had been observed in America, and suggested that the disease was very much more common than had been ordinarily suspected. Bridge² reported 7 cases of pulmonary actinomycosis two years ago. He believes that if examinations were made with a view of demonstrating the streptothrix, more cases would be found. He reported in all 17 cases. In any case in which small, round, yellow sulphur granules are found in the sputum, the specimen should be stained by the Gram method, and also cultures made in bouillon. These may be examined every twenty-four hours in hanging drop preparations, and also by staining by Gram's method. Dr. Edith Claypole, who has been working with Bridge, suggests that specimens of sputum containing faint blue-staining bacilli in notable numbers, which persistently refuse to grow in ordinary media and are Gram positive, should be critically searched for the streptothrix of actinomycosis. The symptoms are always suggestive of tuberculosis, and in cases of suspected tuberculosis, in which tubercle bacilli cannot be demonstrated in the sputum, examination should be made with reference to the streptothrix.

¹ American Journal of the Medical Sciences, July, 1911, p. 88.

² Journal of the American Medical Association, November 4, 1911, p. 1501.

The Treatment of Human Actinomycosis. Poncet and Bérard¹ have contributed a short article on this subject, and there are few who are prepared to speak so authoritatively on it. Their treatise upon this subject, published in 1898, is perhaps the best work on actinomycosis that exists, and since that time they have contributed various articles to the Academy of Medicine on the same subject.

No real progress has been made in serum-therapy or in vaccination, due perhaps to the fact that there are always other microbes present as secondary infections.

Iodide of potash holds the first place among the drugs that have been found of use, and other preparations of iodine have also been used, as have preparations of mercury and arsenic.

In 1908, Foderl, of Vienna, reported 6 cases of cure by the internal administration of cacodylate of soda. Phototherapy and radiotherapy have also been used, and the authors believe that, in at least one of their cases, exposure to the x-rays on diffuse lesions in the neck, led to rapid extension into the deeper tissues.

From a therapeutic standpoint they divided their cases into three groups, the first including the benign cases where there are hard nodules or occasionally softened ones, but where there are no fistulas. In these cases where it is possible the infiltrated area should be removed, and the individual given iodide of potash. While the results are good they are not always so.

The second, or ordinary type with the cervicofacial lesions, livid infiltrated skin, and a subcutaneous tissue with hard lines and alternating fluctuating spots with the recent or opening fistulas, presents a clinical picture the diagnosis of which can almost always be made at sight. The treatment in these cases consists of using a curette, thermocautery, and application of caustics and of antiseptics, and the opening of the abscesses, and at the same time the internal use of iodine. The results are less satisfactory than in the preceding.

The third group comprises the visceral class in which the lungs, pleura, and digestive apparatus, or the genito-urinary organs, are involved. Operative interference in most of these cases simply makes the trouble worse, and the tendency is to set up new foci of the disease. The use of iodine or arsenic is recommended, and it should be borne in mind that the mortality varies from 40 to 90 per cent., according to the part of the body infected.

These authors have used, in the last fifteen years, all the newer medicinal agents, and still cling to their original suggestions that the use of potassium iodide is the best form of medication.

Amebiasis in the United States. King² has reviewed the question of the occurrence of amebic dysentery in the southern part of the United

¹ Gazette des Hôpitaux, February 2, 1911, p. 181.

² Journal of Tropical Medicine and Hygiene, June 15, 1911, p. 182.

States, and has come to the conclusion that while the disease does occur, it is much rarer than the popular impression would seem to indicate. He believes that most of the dysenteries in the South are the bacillary form. He also calls attention to the fact that liver abscess, which is so common in the tropics in connection with amebic dysentery, is a very rare condition in America. He believes that this is due to the difference in food and the general hygiene. Fortunately, the exact extent of amebic infections will probably be known through the work of the hookworm commission, and, if it is widespread, doubtless the same means that are taken to check the spread of the hookworm will also influence the ameba.

The Treatment of Amebic Dysentery and Threatened Liver Abscess by the Use of Ipecac.—Dudley¹ calls attention to the use of ipecac in amebic dysentery, and states that he has treated several hundred cases in the Philippines, and he does not know of a single case of liver abscess complicating amebic dysentery, where the ipecac treatment was instituted early in the disease and properly carried out.

I noted the use of ipecac in amebic dysentery in *PROGRESSIVE MEDICINE*, March, 1911, and there seems to be no question of the efficiency of this method of treatment. The great difficulty is to get the patients to take the drug and to retain it. For this purpose the patient is usually placed in bed with ice-bags frequently used over the neck, mustard plasters for counterirritation over the abdomen, and the drug given on an empty stomach. Notwithstanding this, or even the administration of it in keratinized capsules or salol coated pills, nausea is apt to be very marked, and the drug vomited. The discomfort of the patient is extreme.

Beck, of Baltimore, in a paper not yet published, has called my attention to a new method of administering ipecac which he has used with remarkable results. This consists in using an Einhorn duodenal tube, which may be done in most patients without any discomfort. After the tube is passed into the duodenum, the ipecac is injected by means of a syringe. Beck uses a dram to a dram and a half of powdered ipecac to six ounces of water, and this may even be administered in the physician's office, and the patient allowed to go home without suffering any discomfort. The tube may be left in for several days if so desired, and the treatment repeated on subsequent days. Beck has obtained good results by repeating the injections three times on alternate days. This is a great advance in ipecac therapy, and will furnish a means of treating amebic dysentery cases which have heretofore bothered the practitioner greatly.

Anthrax. THE TREATMENT OF ANTHRAX BY SCLAVO'S SERUM. Fergusson² has reported a case of anthrax on the back of the hand of a

¹ *Surgery, Gynecology, and Obstetrics*, August, 1910.

² *British Medical Journal*, July 15, 1911, p. 103.

farmer who had previously handled a heifer that had died from anthrax. At the time, he was feeling well and the temperature was normal. The pustule was cauterized. Shortly afterward fever developed and by the next day he was very ill and was unconscious part of the time. It looked as if he would die at any moment. Forty cubic centimeters of the serum were injected under the skin, and one hour later he began to rally, and the temperature began to fall; it subsequently went up, but gradually fell to normal, and he made a perfect recovery. The incubation period in this particular case was unusually long, ten days, although there may have been some doubt concerning this. The other point of interest is that recovery occurred without excision of the pustule.

Sclavo's serum has been used in European countries to a certain extent, but little, if any, in America. It was first suggested in 1895, the original publication appearing in Rome. Animals are immunized with Pasteur's anthrax vaccine, and then by giving large doses of virulent bacilli mixed with gelatin; the gelatin apparently prevents the formation of abscesses. This serum is used in doses of 20 to 40 c.c., given subcutaneously, or, what is better for the first dose, intravenously. It should be repeated at intervals of twenty-four hours as needed. As a rule, however, marked improvement occurs within that time, and is often accompanied by profuse sweating and a rise of temperature. Lazaretti, a few years ago, reported the results of 23 cases treated with this serum, and there was only one death.

TREATMENT OF ANTHRAX BY THE PYOCYANEUS. Fortineau¹ has made a study of this subject and reports the results of his experiments in animals and the injections in one case of human anthrax.

As early as 1889, Bouchard and Charrin called attention to the curative effects obtained by injecting the *Bacillus pyocyaneus* into guinea-pigs and rabbits suffering with anthrax, and in the same year Woodhead and Cartwright Wood arrived at the same results by using the toxin of the pyocyaneus.

Fortineau showed that animals vaccinated with the *Bacillus pyocyaneus* developed a remarkable resistance to anthrax, and that the toxin of pyocyaneus exerted remarkable curative effects. He was also able to obtain the same result in larger animals, for example, the sheep, by injecting the toxin at the point of inoculation some hours after the infection, and he was also able to obtain results by injecting at another point.

One case, that of a girl, aged twenty years, who worked in a brush shop, became infected on the left cheek; 3 c.c. of the toxin were injected 2 cm. deep under the skin, and the following day the same dose was repeated, and the same two days later. The patient made an unin-

¹ Annales de l'Institut Pasteur, December, 1910, p. 955.

errupted recovery. The symptoms at the time of the injection were exceedingly marked, and the case was one of typical anthrax. This is a subject of considerable importance, and, considering the bad results obtained by the ordinary methods of treatment, it is certainly worth further investigation.

The Asiatic Blood-fluke. The increased amount of travel in all parts of the world has led to the carrying of the various parasitic diseases from one place to another, and among the diseases which may in the future be borne in mind, is one of the various forms of blood-flukes. Logan¹ has reported a case of the infection in China of an American child with *Schistosomum japonicum*. The infection doubtless took place in this case by the child wading with bare feet in a pond, and this method of infection is one of the commonest.

The infection by this parasite apparently almost always takes place through the skin, but not always. Cats and dogs may be infected in an hour and a half by immersion in the fields where the parasite is found. The disease cannot be given to cats, according to Katsurada, by feeding them with the parasite.

The symptoms are similar to those found in the African blood-fluke first described by Bilharz in 1852, and which has been found in Panama, Cuba, and Porto Rico, and a few scattered imported cases have been reported from various parts of the United States. (See also Hepatic Distomiasis.)

Bilharziasis. BILHARZIASIS IN THE UNITED STATES. Lane² has reported a rare instance in appendicitis due to the *Bilharzia hematobia*. This is another example of an African disease being brought into this country, the patient in question having been in South Africa with the English army.

But comparatively few cases have been reported in this country. About 5 cases were reported up to 1904, and an article by O'Neill³ gives an excellent account of the disease and its literature. Since that time there have been about 5 cases reported, and it is very probable that the disease will become more common as the intercourse between Africa and this country increases.

Recent studies in the disease are more concerned with the method of entrance into the body, and this question has not been definitely settled, although Looss thinks that the infection probably occurs through the skin, and that there is probably some intermediate host.

RECTAL BILHARZIA. Meader⁴ has reported a case occurring at the Massachusetts General Hospital, of a Greek who came to this country about eighteen months before admission. He entered the hospital on account of a bloody diarrhea without other symptoms. Examination of

¹ Journal of Tropical Medicine and Hygiene, May 1, 1911, p. 133.

² Boston Medical and Surgical Journal, December 22, 1910, p. 937.

³ Ibid., 1904, p. 453.

⁴ Ibid., July 15, 1911, p. 51.

the blood showed there was no eosinophilia. The diagnosis was made from finding the ova of the bilharzia in the stools, and a rectal examination revealed considerable inflammation. He remained at the hospital nearly a month, and left somewhat improved, although the condition as regards the parasite had not changed appreciably.

TWO RARE MANIFESTATIONS OF BILHARZIASIS. Madden¹ has reported 2 cases of this disease of exceptional interest. In the first, the lesion was in the spermatic cord and simulated tuberculosis of the epididymus. This occurred in a boy, aged fourteen years. The mass was removed and subsequent examination showed the true nature of the disease. The second was a case of a young soldier who sought relief from blood-stained nocturnal emissions. The diagnosis was suspected, and subsequently the bilharzia ova were found in the urine.

THE TREATMENT OF BILHARZIA WITH SALVARSAN. Joannidès² has treated 8 cases of bilharziasis by injections of salvarsan, and he believes that in this disease it is one of the best remedies that can be used and that it exerts a marked action on the organism and its eggs. In the absence of better methods of treatment, salvarsan can be recommended, as the results are more encouraging than with the older methods of treatment.

Bothriocephalus Latus in America. This so-called broad tapeworm is a native of Finland, Russia, and the other countries bordering on the Baltic. It has also been noted in Japan. Until a short time ago there have been but few cases reported in this country. Recently, Warthin has made a report of the occurrence of this disease about Lake Superior. It seems probable that a body of water connected with Lake Superior, called Portage Lake, has become contaminated with this organism, and there is at least one case of a child, aged five years, who had never been out of the country, but had eaten uncooked fish from this lake and so contracted the disease. The parasite was undoubtedly brought over by the Finnish and Swedish immigrants. The organism affects the fish and is conveyed to man through the eating of these fish uncooked; both herring and white fish are smoked and often eaten without further cooking. This is a matter for further careful investigation, as this parasite is capable of causing very intense symptoms.

Brill's Disease. In 1910, Brill³ published a study of 221 cases of an acute infectious disease, which he has observed during the last fourteen years in the wards of the Mt. Sinai Hospital. More recently he⁴ has published a supplementary article including 34 additional cases and the results from autopsies. The disease is an acute infection of unknown origin, characterized by a short incubation period (4 or 5 days), a

¹ Lancet, September 9, 1911, p. 754.

² Deutsche medicinische Wochenschrift, August 24, 1911, p. 1551.

³ American Journal of the Medical Sciences, 1910, p. 484.

⁴ Ibid., August, 1911.

period of fever, which develops quickly and reaches its maximum on the third day, after which it remains rather constant, averaging between 103° and 104°. The disease begins suddenly and may begin with a chill or chilly sensations. The patients are prostrated and are usually apathetic. On the fifth or sixth day there is a rather characteristic eruption, which is fairly profuse, but discrete, consisting of a macular papular rash, dull red in color, erythematous in character, and the spots are irregular in outline, more or less ovoid, and from 2 to 4 mm. in diameter. The spot fades on pressure, but cannot be entirely obliterated. Sometimes the spots are distinctly hemorrhagic. The eruption appears on the trunk and extremities, is never as profuse as in measles, and may show less than a hundred individual spots in some cases. It comes on rather suddenly and all at once, being fully developed within twenty-four hours after the first spot, and it lasts until the end of the disease. After twelve to fourteen days the fever falls, sometimes becoming normal within twelve hours, in others within thirty-six hours, and sometimes with a definite lysis, extending over as much as sixty hours. The headache disappears, the spots fade rapidly, leaving only brownish-yellowish stains on the skin, and the convalescence is speedy. Occasionally there is a varying course of the disease; there may be slight rigidity of the neck and Kernig's sign may be noted. In most cases there is a trace of albumin in the urine. The white blood count averages 11,000, and blood cultures are absolutely negative. The blood shows no power of agglutinating any of the organisms of the typhoid group. It has never been spread to anybody in the wards of the hospital, and Brill has in but one exception seen it in more than one member of a family. The sexes are affected about equally; the youngest patient was eighteen years of age and the oldest fifty-nine. Most of the cases occurred in the spring or fall, with more during the latter half of the year. In the autopsies of the fatal cases, there is congestion and a general parenchymatous degeneration of the organs, such as might be noted in any intense infectious disease. The staphylococcus albus and citreus were found, but these were probably late invasions. Inoculation experiments made on monkeys were negative, the method of experimenting being intraperitoneal, and subcutaneous injection of freshly drawn blood, and also some of the material obtained from autopsy. Brill calls attention to the fact that while it resembles typhus fever, there is absence of the marked nervous symptoms, of active delirium, and of coma or coma-vigil.

It would be interesting to have experiments made by allowing lice to feed on the blood of the patients and then upon monkeys, as it is in this manner that typhus fever is transmitted. Friedman¹ believes that these cases of Brill's disease are identical with mild and moder-

¹ Archives of Internal Medicine, October, 1911.

ately severe cases of typhus fever. He believes that typhus fever occurs sporadically in many regions, and that it is not as fatal as in former years, or, at any rate, as the figures quoted by older observers would lead us to believe; and he notes that Brill's disease was observed in the wards and not among the private patients of the hospital, and in patients from the poorer classes—that is in the New York tenement houses. Friedman calls attention to the fact that palatial residences are nearly always immune to the typhus bacillus, while they are not secure from typhoid, scarlet fever, or measles, the reason being that typhus fever is transmitted by lice which are not found, or only in exceptional cases, in the better class of people. Friedman also believes that Manchurian typhus, described above, was simply mild cases of typhus fever. Whether or not this view of Brill's disease is correct can only be determined by further study, and it will be exceedingly interesting to learn whether his views are substantiated. If this disease is not typhus, it apparently belongs to the same group of diseases, and might be regarded as a paratyphus, although, until further experiments are made, the exact nature of the disease is merely a matter of conjecture.

Tropical Bronchomycosis. Castellani¹ has made some studies of tropical parasites, and among others has described an organism which he has observed frequently in Ceylon, and which caused either a light or severe form of bronchitis. The lighter cases were fever free, the patients felt well, had a dry cough, with an expectoration of mucus and pus similar to the expectoration seen in tuberculosis. In this expectoration there was an organism for which he suggested the name *Oidium tropicale*.

Transmission of Cat Itch to Man. Thibierge² has called attention to this subject, a disease which is commonly seen in cats, rabbits, and rats, and which is caused by *Sarcoptes notodres* (Borguignon and Delafond) or the *Sarcoptes minor* (Fürstenburg). This usually affects the cat either on the head or on the ear, and produces small lesions suggesting the bites of fleas. There are papules, then vesicles, and finally crusts, and the hairs are clotted together by the discharge and finally fall out. Over the affected areas the skin is swollen, harder and less elastic than over the other parts of the body. Transmission of this disease has been observed at various times, but not much attention has been paid to it in the text-books on dermatology. Thibierge reports a series of 8 cases seen during the year 1910, and states that it is particularly common in veterinarians and others who work about veterinary hospitals.

In human beings, it begins with a red papulous line two or three millimeters in diameter or more, and in the centre is seen a small shining miliary vesicle. This is excoriated by scratching, and the spot

¹ Philippine Journal of Science, 1910, vol. v, No. 2.

² Gazette des Hôpitaux, January 31, 1911, p. 163.

soon becomes covered with crusts. It may remain localized or it may spread. In the pure cases there are neither the scratch marks nor the purulent vesicles, but as a rule secondary infections take place early. There is intense itching, especially at night. The distribution of the lesion may be extremely curious, and the differential diagnosis to a certain extent may depend upon this. The presence of the intense pruritus with papular eruption should suggest it, and the absence of the lesions upon the hands, the mammary regions, and the absence of burrows should eliminate human itch. The absence of scratch lines with pustules, and a predominance in the subscapular and intra-scapular regions is of some assistance in differentiating the eruption caused by clothes lice, and its rapid development separates it from prurigo.

The *diagnosis*, when suspected, is usually easily confirmed by finding the cat with which the individual has been in contact. The *treatment* of the disease is very satisfactory. The patient should be separated from the infected animal, and contaminating clothing, and should be thoroughly bathed, and some ointment, such as Lassar's paste, with the addition of 1 per cent. of menthol or 1 per cent. of phenol thoroughly applied.

Hemorrhagic and Gangrenous Chickenpox. We are so accustomed to regarding varicella as a very light disease that it may be well to call attention to the fact that at times it may be an exceedingly dangerous malady. Knowles¹ has reported an instance of hemorrhagic form of the disease in which there was also gangrene, and has collected some of the more recent facts from the literature. In the hemorrhagic form, the vesicles contain blood two or three days after the disease begins. There are very marked general symptoms and usually more or less fever. In some instances there may be vomiting of blood, and it may also be passed in the stools. In some instances some of the vesicles are hemorrhagic, while the others are normal in appearance. The disease has been described in infants as young as six months, and in children of various ages, including adults. Other cases of the disease about the hemorrhagic patients may be of the ordinary type. In the more favorable cases, these lesions are gradually absorbed without further change, or pustules may develop. In the unfavorable cases, gangrene of the skin supervenes, sometimes forming large deep punched-out ulcers, sometimes accompanied by gangrene of the cheeks and of the genital organs similar or identical with noma. The patients usually are very much prostrated, and either die from exhaustion within a few days or weeks, or from complications in the lungs or kidneys. There is also a form of gangrenous non-hemorrhagic varicella first described by Hutchinson in 1881. In this form, which is occasionally accompanied by a

¹ New York Medical Journal, May 6, 1911, p. 876.

purulent iritis, the vesicles start to dry up in the usual manner, and then become surrounded with an area of inflammation which becomes pustular, and then ulceration begins beneath the crust. These lesions may run together forming irregularly shaped ulcers, and the general appearance is as if they had been burnt out. There are also cases reported in which the ordinary gangrene of the skin may follow chicken-pox just as it occasionally may follow any infection. The *treatment* of these cases is rather unsatisfactory. In my experience, the gangrene occurring in infants is almost uniformly fatal, and in one or two instances in which patients have recovered, the favorable outcome did not seem to be in any way connected with the therapy.

Cholera. THE CHOLERA SITUATION IN 1911. There have been two chief centres of infection which have threatened not only Europe, but America. These have been in Italy and Turkey. The epidemic which prevailed in Italy last year subsided about January, 1911, the last cases being noted in the extreme south of the Italian peninsula. The disease reappeared early in June, particularly in Naples and Palermo, and the surrounding country. In the succeeding month and a half some 1400 cases were officially reported, but with a very low mortality rate, somewhere about 30 per cent. Subsequently the infection extended into northern Italy, where it was probably sometimes called typhoid and sometimes cholérine. The statement has been made that the disease recurred in Venice and Rome to quite an extent, but it was not reported officially from these places. According to the terms of the Paris Convention, notification to foreign European powers is required, and whether the concealment of cases has actually been practised or not is not certain.

From Italy the disease has been carried into France, a few cases having occurred at Marseilles, and also into Austria, where a few cases have occurred at Trieste and other points. There have also been some cases on the eastern shore of the Adriatic.

The disease was also carried to Boston and New York, and necessitated a change in the usual regulation of the entrance of steerage passengers, the government having provided for the bacteriological examination of all the immigrants. In commenting upon this, the *Lancet* used the following significant statement: "In our opinion it would be very difficult to carry out such systematic examination at English ports. It is not denied that much more care is necessary in America than with us in England, to prevent danger arising from the introduction of cholera germs into a country, where it is admitted frankly that sanitary circumstances and administration generally are not so satisfactory as with us, and where in some places particularly the public water supplies have not been sufficiently safeguarded or protected from excremental pollution. These extra precautions, now

in force in America, may be regarded as the penalty for postponing necessary sanitary reforms until danger has actually arisen."

The second centre in Turkey involved parts of Asia Minor and districts along the southern shores of the Black Sea, and there have been cases sporadically at other points. From Turkey the disease has been conveyed into Greece and Bulgaria. Curiously enough Russia has not been heard of in regard to the cholera situation. In 1910 there were some 216,000 cases, with 101,000 deaths. There have been scattered cases reported, particularly in southern Russia. The absence of the disease from St. Petersburg is probably due to measures taken to purify the water supply which is taken from the river Neva, and which is possibly still badly polluted. It is said that the water is first rendered clear by the addition of aluminum sulphate, and then passed through filters, and afterward to the towers, where it is mixed with ozonized air.

Doty¹ has contributed an interesting article on some of the modern aspects of cholera, and some of our previous ideas concerning this disease will have to be revised in view of the recent experiences in the outbreak of cholera in Europe in 1910.

It was formerly taught that if five days elapse after a person had been exposed to cholera that he was not to be regarded as a source of danger. This is untrue, because there may be mild or irregular cases, the incubation of which may cover a period of weeks, and there may also be cholera carriers, similar to typhoid carriers, in which the symptoms of the disease may never occur; and then it sometimes happens that an individual acting as a carrier undergoes some sudden intestinal upset, and this is followed by a typical attack of cholera which may prove fatal. A good example of this is a case which recently occurred in the New York Quarantine station on a vessel arriving from Naples after a voyage of nineteen days. There had been no deaths on board, no cases of infectious disease or suspicious cases. It was found, however, that 6 men who had applied for treatment for various causes while at sea had not had either diarrhea or gastro-intestinal trouble. These individuals were placed under observation, and were given 2 grains of calomel at bedtime, followed the next day by a cathartic. The following morning one of the group was in a condition of collapse, and died twenty-four hours afterward. Bacteriological examination of the intestinal contents proved that the individual was a cholera carrier.

The modern methods of dealing with cholera epidemics seems to be quite efficient, especially in the presence of a water supply which is not easily contaminated. It is very important, however, that health officers be perfectly familiar with the disease, and enforce rigidly the necessary regulations. Particularly rigid investigation should be made

¹ American Journal of the Medical Sciences, January, 1911, p. 67.

of the death certificates, and individuals should be investigated as to whether they are cholera carriers or not. Bacteriological examination is the only sure method of determining this. On shipboard, cholera epidemics are practically unknown on account of the better sanitary regulations and pure water supply.

ALKALINE TREATMENT OF ASIATIC CHOLERA. Sellard¹ has suggested the intravenous injection of solutions of alkalies in the treatment of Asiatic cholera, the choice of the alkaline agent being varied at different periods of the disease. He has used carbonate of soda, acetate of soda, and bicarbonate of soda. The frequency of the injection and the amount to be injected varies, and he believes that it is best determined by the quantity of urine excreted. He uses injections into the veins of as much as two liters of a 1.5 per cent. solution of bicarbonate of soda, and he advises a repetition of the injection in an interval of from twelve to twenty-four hours until there is free diuresis. If cramp of the muscles appears it is a contraindication to further injections. In comparing two series of cases, one treated with intravenous injections of bicarbonate of soda and the other with injections of isotonic or hypertonic solutions of chloride of sodium, the author found the only difference to be the absence of uremia in the patients treated by the alkaline method. To be successful the treatment should be instituted early, and in the cases in which there is already an appearance of uremic symptoms, the result is apt to be unsatisfactory.

THE RELATION OF NITROUS ACID TO CHOLERA. Rudolf Emmerich² has published an important contribution to our knowledge of cholera, some of the investigations of which were carried out by Cappellani, of Naples. He believes that the symptoms of cholera are caused very largely by nitrous acid poisoning or nitrites. These are derived from the nitrate-containing foods which, through the action of the cholera bacillus, are changed to nitrites.

Nitrous acid and the nitrites are tissue poisons and are never present in the normal body, or, if so, only in traces. He found that the contents of a stomach and small intestine contained nitrous acid and the nitrites, and that the mucous membrane of the small intestine also contained these poisons, and showed an acid reaction in place of the normal alkaline reaction. The examination of 62 bodies of individuals dead from other diseases than cholera the normal, alkaline, or an occasional neutral, reaction was always found. This acid reaction may be regarded as pathognomonic of cholera, although it must be borne in mind that nitrous acid and the nitrites may cause cholera-like symptoms when present, so-called cholera nostras, even when there are no cholera bacilli present. This explains the symptoms found in meat poisoning.

¹ Philippine Journal of Medical Sciences, 1910, and La Semaine Médicale, April 19, 1911.

² Münchener medicinische Wochenschrift, May 2, 1911, p. 942.

They also found nitrites in the blood of cholera patients, and the presence of nitrite or nitrous acid in the urine by the use of Gries' reagent.

If these investigations turn out to be true, they will not only furnish us a valuable diagnostic method and a very simple one, but they will point out a suggestion for the prevention and also the treatment of cholera, namely, the use of a nitrate-free diet. Emmerich is inclined to believe that the natural immunity observed in babies fed at the breast is due to this fact, that is, the taking of food free from nitrates. This is a conception of disease along chemical lines, further investigation of which should be undertaken.

Chorea. BACTERIOLOGICAL INVESTIGATIONS IN CHOREA. Camisa¹ has made a study of the blood in a case of chorea, and, in 6 out of 9 cases, he found in the blood a diplostreptococcus which appeared in short chains. These patients were treated with intravenous injections of bichloride of mercury, became better, and finally, with a disappearance of the bacteria, there was a disappearance also of the choreic movements. In 5 cases, the morphological and cultural characteristics were the same.

The idea that chorea minor is an infectious disease is not a new one, and for the last twenty years various observers have attempted to isolate organisms from the blood and from various parts of the body. As early as 1893 Pianese isolated a bacillus, and some dozen other observers have variously isolated staphylococci, diplococci, and streptococci. It goes without saying that all of these organisms cannot be the cause, and for the present we may regard chorea as belonging to that class of diseases of which we know next to nothing concerning the etiology, unless we assume that it is a toxemia which may be caused by bacteria of various kinds, and perhaps in other ways.

The original opinion of Charcot should be borne in mind, and that is that there is an inherent, degenerative predisposition of the motor apparatus in choreic individuals, and that this predisposition is made manifest by any disturbing cause, and especially infectious diseases.

Gordon² has noted a case of chorea in which the onset was sudden, with chills, fever, headache, vomiting, and general malaise, symptoms not unlike those occurring in acute poliomyelitis, and, in fact, most any infection. He also notes another instance in which there was pus about the jaw, due to streptococci and staphylococci. After this was relieved by proper treatment, the chorea finally stopped.

In poliomyelitis, the motor cells in the anterior part of the cord are destroyed or badly injured and paralysis results, while other cells are merely irritated, and this irritation produces twitching which should be regarded as explaining how a toxin, which irritated the motor and

¹ Centralblatt für Bakteriologie, December 31, 1910, p. 99.

² Journal of the American Medical Association, October 1, 1910.

which did not kill it, could produce a disease like chorea. It is quite possible that there may be a number of bacterial poisons which produce this effect.

THE SUCCESSFUL TREATMENT OF CHOREA MINOR WITH SALVARSAN. V. Bokay¹ has reported an interesting example of rapid cure of a case of chorea of moderate intensity by the injection of 0.2 gram of salvarsan. The injection was followed by a necrosis of the skin which in no way interfered with the action of the drug.

Rumpel² has observed good results in chronic articular rheumatism after using salvarsan, and the two facts taken together are of a certain amount of interest. Anyone who has had much to do with chorea minor is very liable to come to the conclusion that it is one of the infectious diseases, although up to the present time the etiology is very much in the dark, except, of course, that we know of its frequent association with acute articular rheumatism. Remarkable results are occasionally obtained after the use of other drugs, and indeed after rest alone, which would lead one to be exceedingly skeptical of the value of therapeutic measures based on brilliant results in only a few cases.

Common Colds. Honeij³ has made an investigation of common colds, and the economic loss due to them, and his conclusions are based on studies made in Boston. He found out that over one-half of the population have colds during the course of six months, which is the period over which his investigations extended, from December until June, that one-fifth of the population were absent from work on account of colds, the average loss of time in 568 individuals was 6+ days per six months, and the average loss of money was \$21+ per six months, not including individual expenditures for medical treatment, etc. The total loss in six months was \$12,105.37 for 568 individuals, and, in addition to this, he believes that there is a loss of energy equivalent to \$3+ per six months per person.

The most common form is what is known as the head cold, and most of these occur in the month of March, particularly in individuals from thirty to forty years of age. Employees in department stores suffer most of all. He believes that preventive methods are essential in dealing with common colds, and that the most important factors are, better working conditions, purer air, even temperature, proper ventilation, and the proper amount of humidity. Nourishment, general hygiene, and proper clothing are also necessary in guarding against disease, and he believes that individuals suffering from infectious colds should be isolated.

The Colon Bacillus in the Cerebrospinal Fluid. Harthwich⁴ has reported an instance of a man, aged forty-two years, suffering with symptoms of

¹ Deutsche medicinische Wochenschrift, January 19, 1911, p. 111.

² Ibid., December 8, 1910, p. 2287.

³ Boston Medical and Surgical Journal, April 27, 1911, p. 604.

⁴ Berliner klinische Wochenschrift, May 1, 1911, p. 795.

melancholia, who presented no distinct disease of any organs, although he was weak and sickly in appearance. Later he developed signs of meningitis which was thought to be due to tuberculosis. A lumbar puncture showed the presence of the colon bacillus, and no tubercle bacilli. The autopsy made some days later showed the presence of miliary tubercles in the lungs and other organs of the body, and a tuberculous ulcer in the small intestine.

Diphtheria. THE HIGH DEATH RATE FROM DIPHTHERIA IN THE UNITED STATES. Hill¹ calls attention to the fact that in the United States the death rate from diphtheria is unnecessarily high, and he quotes the following interesting statistics concerning this:

YEAR 1908. RATE PER 100,000 OF MORTALITY FROM DIPHTHERIA	
Paris	7.0
Washington	35.4
Rhode Island	29.5
Colorado	28.4
Pennsylvania	27.6
New Hampshire	24.3
California	22.4
Vermont (lowest rate reported)	11.3

He believes that the reason for this is that in the districts apart from the large medical centres, diphtheria is not recognized in a sufficient number of cases, and that antitoxin is not used either in sufficiently large doses or sufficiently often. He also discusses the question of the size of the dose and the efficiency of antitoxin, which may be omitted.

In view of the fact that these statements concerning the use of antitoxin are largely true, it would seem to be a matter of importance that health officers and others should start an educational campaign among physicians concerning the value of diphtheria antitoxin. I believe too that the recent agitation concerning anaphylaxis and its more or less chimerical dangers have deterred many physicians from using antitoxin, or if they have used it, from using it in sufficient quantities. The danger of death from diphtheria is incomparably greater than from an occasional death from serum disease, and of the two evils we should certainly choose the lesser. I believe that it may be safely taught medical students and physicians that antitoxin may be used early, in sufficiently large doses, and the doses repeated as often as necessary, and that, from a practical standpoint, the dangers of anaphylaxis may be disregarded.

METHODS OF COMBATING PERSISTENT DIPHTHERIA BACILLI. Kretschmer² has contributed an important article on this subject. The question of the transmission of the disease by diphtheria bacillus

¹ Medical Record, April 1, 1911, p. 568.

² Medicinische Klinik, Wien, January 15, 1911, p. 99.

carriers has been thoroughly discussed in the past few years, and the persistence of the virulent diphtheria bacilli in the throats of convalescent patients has been a matter of some concern, especially in certain instances where they persist for a very long time.

In order to shorten the length of time in which it is necessary to isolate the patient, various measures have been suggested, among which may be mentioned the gargling or spraying with various antiseptics, of which potassium permanganate and hydrogen peroxide are perhaps the most used. Painting the tonsils with tincture of iodine, and the use of various antiseptic powders have also been suggested. Vaccination with killed diphtheria bacilli and various bactericidal serums has been tried, and in all the results have been about the same, and not any too satisfactory. Some have even gone so far as to suggest the removal of the tonsils.

Kretschmer found that, in patients in the Rudolph-Virchow Hospital in Berlin, even when ordinary cultures were negative, if the tonsil were squeezed or massaged so that the plugs would be forced from the crypts, a positive culture would often be obtained. It occurred to him that this might be a useful method in freeing the tonsil of diphtheria bacilli. This procedure has been in use for some years by throat specialists, particularly in the treatment of persistent and recurring anginas. Kretschmer uses Hartmann's instrument, which consists of a stiff probe, on which is fastened a round head about the size of a cherry, with which pressure is made on the tonsil from the sides toward the middle. The procedure is easy in most cases, but presents some difficulties in children who resist it, and also in the deeply embedded tonsils. He recommends three weeks from the beginning of the disease before this procedure be carried out, and the culture should be made immediately after, and it should be repeated at intervals of several days until the negative cultures are obtained.

DIPHTHERIA CARRIERS AND THE STAPHYLOCOCCUS. Page¹ reports the results of his observations on the use of sprays of the *Staphylococcus pyogenes aureus* in ridding throats of carriers of diphtheria bacilli.

Schiotz, in 1909, was impressed with the fact that individuals with staphylococcus sore throats did not contract diphtheria if placed in the diphtheria wards, and also with the fact that intercurrent attacks of staphylococcus sore throats in several cases terminated positive diphtheria findings in the case of convalescents from this disease. He tried this method in 6 cases, with complete success in each instance. Page's patients made most satisfactory progress, and he suggests that pure cultures of the *Staphylococcus pyogenes aureus* should be sprayed in the throats of the carriers of diphtheria bacilli, and that this would drive out the Klebs-Loeffler bacilli in from forty-eight to seventy-two

¹ Archives of Internal Medicine, January, 1911, p. 16.

hours. This method has also been found useful immediately after convalescence from an acute attack, and he believes that it is probable that its use during an acute attack of diphtheria would be successful, although he believes at the present time it would be inadvisable to attempt its use in any except mild acute cases. He states that this method of treatment is harmless, and should be used in all cases of carriers. Catlin, Scott, and Day¹ have also used this method in 8 different nurses. The results have been very satisfactory, and apparently no harm resulted from the application of the spray. I think, however, one would hesitate to recommend this method for general use on the evidence afforded in 7 reported cases, and the supplementary note that it had been used by members of the Philippine Bureau of Science without disagreeable results. It opens up, however, a field of inquiry which should prove fruitful, and one would be inclined to believe that it would be possible that the same thing might be accomplished by using an organism which would be less dangerous in case actual infection occurred.

RETURN CASES OF DIPHTHERIA. Sorensen² has studied the *return cases* which enter the hospital after the patient who has had diphtheria has been discharged and returns home. At the Bledgam Hospital, in Copenhagen, during the past twelve years they have had 7037 diphtheria patients, and from the families of these there have returned 82 cases, or a proportion of 1.16 per cent. Most of these cases occur between the fourth and twelfth days after the return of the patient, and if the interval is shorter or longer than this, Sorensen is inclined to believe that another source of infection must be sought. Eighty-two of the patients regarded as a cause of these return cases were examined bacteriologically, and, curiously enough, only 8 showed the presence of the diphtheria bacilli in their throat. Most of these cases were examined two or more times. Along with this observation the statement may be made that about 9 or 10 per cent. of those patients leaving the hospital have the bacillus in their throats, and something like 700 cases have left the hospital during the past twelve years as diphtheria carriers, and only 8 of the return cases, or a little over 1 per cent. could be traced to these bacillus carriers. This is a most remarkable observation, and should lead to the study of this question in other hospitals for infectious diseases. It may also be noted that the return cases were not of any special gravity, and there were no deaths among them. This is just the opposite from what is observed in scarlet fever, where the return cases are usually severe and have a high mortality.

REPORT OF THE COMMITTEE ON THROAT CULTURES. This committee³ has made a report which contains several things of interest, among

¹ Journal of the American Medical Association, October 28, 1911, p. 1452.

² Hospitalstidende, April 26, 1911; La Semaine Médicale, September 6, 1911, p. 432.

³ Journal of the American Medical Association, September 16, 1911, p. 976.

which are the following circulars of information concerning throat cultures:

A positive report cancels all previous negatives on the same case.

A negative report may mean any one of the following:

1. Absence of *Bacillus diphtheriæ* in the throat.
2. Failure to reach the bacilli with the swab. This occurs frequently in laryngeal cases, and may occur in pharyngeal cases through imperfect technique. (See instructions.)

3. Failure to inoculate the medium properly.

4. A very few diphtheria bacilli in the presence of many other varieties may be overlooked by the bacteriologist. Statistical study shows this to be infrequent.

"Suspicious organism" calls for a second culture. Antitoxin should be given at once and temporary isolation instituted. All suspicious cultures will be reincubated, and will be reported a second time if more definite findings are obtained.

"No growth" means nothing. Diagnosis is withheld and a second culture is required. It may be due to:

1. Use of an antiseptic in the throat previous to taking the culture.
2. Failure to inoculate the medium properly.

"Contamination" means nothing. Diagnosis is withheld and a second culture is required.

It is further recommended that the report of the laboratory cover the following findings only:

Bacillæ diphtheriæ present.

No *Bacillæ diphtheriæ* found.

Suspicious organism.

Streptococcus (when the predominating organism).

Bacillæ influenzæ (when the predominating organism).

Spirillum of Vincent.

No growth.

Contamination (when sufficient to invalidate the diagnosis).

It should be noted that nose and throat cultures should be taken with separate swabs to avoid transferring the infection from one cavity to the other, and also in order to get pure cultures from both localities. For the purpose of diagnosis separate culture tubes should be inoculated from each swab, while in making cultures to see whether a case may be released or not, both swabs may be rubbed over the same culture tube. It is recommended that all terminal cultures be taken from both the nose and throat.

In collecting information concerning the staining of the diphtheria bacillus, it was found that the majority preferred Loeffler's methylene blue. Epstein's method because of its simplicity is highly recommended. In this method the slide is stained in the ordinary way with Loeffler's methylene blue, after which the slide is flooded with Gram's iodine

solution, and then washed in water and examined. The granules are stained blue, while the body of the bacillus is colored brown. Personally, I have got most excellent results by the use of Neisser's method, which permits one to make a diagnosis with ease, and it is quite as easy to use as the Epstein method. In some laboratories a test is made for the virulence of the bacilli present, both in cases of prolonged quarantine and in cases where the bacillus is found in carriers who are not ill. One state institution conducts virulence tests of the organisms in all cases in which the duration of the quarantine is thirty days or over. For this purpose the organism is obtained by pure culture, and a guinea-pig inoculated. If the pig dies within four days, and there is localized necrosis at the sight of the injection, and the organism recovered, it is regarded as a positive test. The following simple directions for taking cultures is suggested:

Sample Directions for Culturing.

(Outfit contains two swabs in one test-tube and one culture-tube or culture-box.)

Throat Culture. No local antiseptic application should be made for at least two hours previous to taking the culture. The patient's throat should be cleared of any adherent food particles, etc.

1. Have the patient in good light.
2. Rub the swab thoroughly against any membrane, exudate, or inflamed area in the throat, revolving the swab in the fingers in such a way as to bring it thoroughly in contact with the suspected area.
3. *Do not lay the swab down* or allow it to touch anything other than the surface of the serum.
4. Insert the infected swab into the serum-tube and rub it gently back and forth over the entire surface of the serum, revolving the swab so as to bring it thoroughly in contact with the serum. Do not break the surface of the serum by pushing the swab through it. Do not use the medium if it is dry or contaminated.
5. Replace the infected swab in its own tube and replace the cotton plugs in both tubes.

6. Directions for sending to the laboratory:

Nasal Culture. Cultures for release must be taken from both the nose and throat in all cases. Use one of the two swabs in the outfit for the nose and the other for the throat, rubbing both swabs on the same serum. Cultures for diagnosis may be taken from the nose alone or from the throat alone. If it is desired to take cultures for diagnosis from both the throat and nose, use a different serum-tube for each.

1. The physician should stand behind the patient, who should preferably be in a sitting posture, if the patient's condition allows it. Place the left hand on the patient's chin and hold the head firmly against

the body of the operator. With the right hand insert the swab about one-half inch upward into the right nostril. Then raise the hand so that the shaft of the swab is parallel to the floor of the nose, and with general rotation pass the swab back to the posterior pharyngeal wall. Withdraw the swab and repeat the process in the other nostril.

2. *Do not lay the swab down* or allow it to touch any object other than the surface of the serum.

3. Insert the infected swab into the serum-tube and rub it gently back and forth over the entire surface of the serum, revolving the swab so as to bring it thoroughly in contact with the serum. Do not break the surface of the serum by pushing the swab through it. Do not use the medium if it is dry or contaminated.

4. Replace the infected swab in its own tube, and replace the cotton plugs in both tubes.

5. Directions for sending to the laboratory.

ACTIVE IMMUNITY AGAINST DIPHTHERIA. Various Russian observers, among whom may be mentioned Blumenau,¹ Dershovsky and Boldireff,² have studied the question of producing active immunity in children who have been exposed to diphtheria, and the results of their experiments are worthy of note. It may be mentioned in passing that the immunity conferred by the injection of diphtheria antitoxin is passive and of short duration, probably not over a month or six weeks. The active immunity lasts much longer, although at this time it is not possible to say exactly how long.

Dershovsky produced an active immunity in his own body by subcutaneous injections of increasing doses of diphtheria toxin and finally succeeded in producing an immunity of such a degree that 1 c.c. of his blood contained one antitoxin unit. Boldireff showed that very small doses of toxin were sufficient to produce reasonable degrees of active immunity. It has also been shown that the toxin may be introduced very simply by pledgets of cotton soaked in the toxin and introduced into the nares. This method was applied to 17 children, in most of whom a sufficiently high degree of active immunity was produced.

THE SITE OF INJECTION FOR DIPHTHERIA ANTITOXIN. There has been so much said on this subject that just one word may not be out of place. I think the best place to give injections of antitoxin is in the subcutaneous tissue of the abdomen. They can be given there more easily, cause less discomfort, do not restrict the movements of the individual, and, in case there is soreness following, the patient may assume any position without discomfort. Injections deep into the muscles or into other parts of the body are liable to produce pain and discomfort, which is entirely unnecessary, and injections into these regions do not add anything to the efficiency of the antitoxin.

¹ Vratsh, 1911, No. 5.

² New York Medical Record, May 6, 1911, p. 819.

DIPHTHERITIC CONJUNCTIVITIS. Harry Friedenwald¹ has reported an interesting instance of a severe catarrhal conjunctivitis due to the diphtheria bacillus, which ran its course without the development of a membrane. The patient, aged fifty-six years, had at first a very mild conjunctivitis of the right eye. It was thought that the irritation was possibly due to formaldehyde, and a 5 per cent. solution of argyrol was used, but the condition increased. A few days later the lids became greatly swollen, and there was also congestion of the pharynx, of the nose, and of the tonsils. Up to this time the bacteriological examinations had not given anything positive, but finally the diphtheria bacillus was found in the pharynx. Within the next two days about 40,000 units of antitoxin were given, and the patient eventually made a good recovery. Convalescence on the part of the eye was slow, and for some time there was a painful ulcer of the cornea. It is exceptional to find diphtheria attacking the conjunctiva in patients as old as this, and in cases due to mixed infections the diagnosis is particularly difficult.

TREATMENT OF DIPHTHERITIC PARALYSIS OF THE SOFT PALATE. Fumarola² has contributed an interesting article on the use of electricity in the treatment of paralysis of the soft palate, and reports his results in 5 cases.

Paralysis of the soft palate is one of the most frequent forms of diphtheritic paralysis, and, as a general rule, spontaneous cure takes place more or less rapidly. Electricity has been suggested by numerous observers, among whom may be mentioned Erb, who suggested the use of the galvanic current for several minutes at a sitting, placing the anode in the auricular mastoid fossa or at the base of the neck. The current should be sufficiently strong to produce movement of the muscles of the tongue or of the lips by closing the current by bringing the cathode in contact with them. The applications are made with a special electrode, and the uvula and the soft palate touched at various points. Others have suggested the use of a faradic current, but the application of these in children is practically impossible, owing to the difficulty of making the necessary manipulations.

Fumarola used Larat's³ method, which consists of using very rapidly the intermittent faradic current, or, perhaps better, the alternating sinusoidal current. One of the electrodes, in the form of a plate, 9 by 12 cm., is placed on the nape of the neck on the level with the cervical vertebræ, and the current is closed by plunging alternately the arms and feet in a basin of water in which the other electrode is placed. The duration of the application should be about a quarter of an hour, and the current should be clearly perceived, but not sufficiently strong

¹ Journal of the American Medical Association, May 20, 1911, p. 1454.

² Il Policlinico, Sezione Pratica, March 12, 1911, p. 325.

³ Le Traité Pratique d'Electricité Médicale, p. 312.

to be painful. He does not regard it as being of any service to attempt the use of electrodes direct to the palate. Larat also claims that by the use of this method paralysis of other parts of the body may be lessened, an observation which one should be inclined to accept with a great deal of reserve. In the cases that have lasted for several weeks, remarkably good results have been obtained; in some, however, no results have been obtained whatever, and if used too early, before the inflammatory stage is passed, it may result in making the condition worse instead of better.

ABDOMINAL DIPHTHERIA. Everall¹ has related an instance of intestinal diphtheria which is of considerable interest.

The patient was a boy, aged six years, who was apparently convalescing from a nasopharyngeal diphtheria. On the seventeenth day vomiting began, and an ounce of castor oil was given and retained, but vomiting returned and became almost constant. The pulse was 158, and the temperature 103° F. After six hours the temperature was 104.5°, and the pulse 170. The abdomen was distended and tender, especially below the umbilicus, and the patient vomited a dark green material. An enema failed to give relief. At this time alarming respiratory and circulatory symptoms began, the respirations were hurried and regular, and then suddenly ceased, while the pulse and heart sounds became imperceptible and the face cyanotic, the whole attack lasting only two minutes. Two doses of antitoxin were given, followed by a rapid abatement of symptoms, and two days after the last dose of antitoxin, following a dose of calomel and an enema, the patient passed a large amount of foul bloody feces containing a necrotic membrane three inches long, having the appearance of a cast of the intestine. The patient made a slow recovery.

A MEDIUM FOR THE DIPHTHERIA BACILLUS. Rankin² and Coplans³ reported upon the use of a special medium for the growth of the diphtheria bacillus, and they suggest the use of a medium which was worked out by Coplans, which consists of blood serum of the sheep, 3 parts; bouillon, 1 part; glucose, 0.5 per cent.; potassium sulphocyanide, 1 per cent.; and 0.5 per cent. aqueous solution of neutral red, 2 per cent. They suggest that only very good serum be used, and that the glucose be invariably added. The potassium sulphocyanide solution should be made fresh each time, and the medium should not be kept too long; they have not kept any for more than six weeks. They claim that by the use of this medium the presence or absence of the bacillus can be made without the aid of a microscope, although, of course, this is used to verify the results. They do not claim that the method is infallible, but, where numerous examinations have to be made, that it saves a great deal of time. When the bacillus is present it produces a pink color,

¹ Journal of the American Medical Association, January 21, 1911, p. 199.

² Journal of Hygiene, July, 1911, p. 271.

³ Ibid., p. 274.

and when diphtheria bacillus is absent there is no pink color. There are certain cocci which also produce a pink color, but which can be distinguished from that produced by the diphtheria bacillus. Rankin has used over 3000 tubes, and has not seen a single instance in which the non-pink medium showed diphtheria bacillus. Coplans' article deals largely with the technical side of the subject, and with the details of the experiments which led to the adoption of this medium. If these results can be confirmed by other observers, the use of this medium will reduce the labor of the diphtheria examinations by about 90 per cent., because by the absence of the pink color the negative cases can at once be determined, and the microscopic examination limited to those tubes in which the pink color has developed.

Epidemic Dropsy. Greig¹ has made a report on this disease which was first noted in Calcutta in 1877. After several years the disease apparently disappeared, to reappear in 1901. Since that time it has spread to such an extent that the Government undertook an investigation. The disease resembles beriberi in many respects, particularly the type known as "ship beriberi," in which dropsy is the chief symptom, and the neuritis of secondary importance.

The chief symptom of the disease is a marked edema, particularly of the skin and subcutaneous tissues, although in the severer cases there may be effusions into the serous cavities. It is quite possible that the disease is due to errors in diet, as most of the cases are found among the Bengalis, and they are in crowded sections of the city, the other natives and Europeans not being attacked by the disease. The dietary of the Bengalis consists chiefly of rice and of finely sifted wheat flour.

No attempt was made in the hospitals to isolate the cases, and the disease did not spread. Animal experiments made upon monkeys by inoculating fresh blood gave negative results, and all attempts to isolate the microorganism from the blood, urine, feces, and dropsical effusion were unsuccessful.

Vaccine Treatment in the Prevention of Dysentery in Infants. Lucas and Amoss² have made some studies on this subject, using a standard vaccine made from a twenty-four-hour agar growth of the bacillus dysenteriae of Flexner. The small number of cases experimented with is not sufficient to draw any very definite conclusions. They found that the vaccine did no harm, and that the reactions in the majority were mild and of short duration. Ninety-five patients in all were vaccinated, and out of these 93 remained perfectly well during the entire summer. Two of the patients died from an acute infectious diarrhea, and in both instances, they were children living under the worst of sanitary condi-

¹ Scientific Memoirs by Officers of the Medical and Sanitary Department of the Government of India, 1911, p. 45; Journal of the American Medical Association, September 2, 1911, p. 826.

² Journal of Experimental Medicine, May, 1911, p. 486.

tions. As early as 1898 Shiga tried a vaccination method, and also a combination of killed cultures and a specific serum injected simultaneously. The effect of this vaccination did not cause any reduction in the morbidity, but the mortality, which had been from 30 to 40 per cent., was reduced to almost nothing. The immunity which he produced lasted only three or four weeks. In America, in the cases of infantile diarrhea in which the dysentery bacillus is found, the organism is usually of the Flexner type. Up to the present time neither curative nor preventive measures have availed very much.

Hepatic Dystomiasis (Sheep Rot) in Man. Ward¹ reported a case of this disease occurring in England, and states that since 1793, when Trentler first recorded a case of the parasite protruding from a ruptured vein in a man's leg, there have been 23 cases reported, some of which are doubtful, but that some 13 or 14 are unquestioned. Four of these have been noted in Great Britain.

The disease is caused by a distoma, and Ward considers it a species of *Fasciola hepatica*. There are four other species of this parasite which have been found in man. The *Bilharzia hematobia*, found particularly in Egypt, the *Distoma sinense*, occurring extensively in Japan, China, and India, and affecting primarily the liver, and the *Distoma westermanii*, found in the far East and causing a pulmonary disease characterized by cough and hemoptysis. The *Distoma hepatica* is found in the gall-bladder and bile ducts of sheep, and, more rarely, in cattle. The eggs are conveyed by the bile into the intestine, and eventually reach the water or damp grass which is essential to their further development. After a time varying from three or four weeks to as many months, according to the time of the year, a ciliated embryo emerges from each egg. These soon enter a small snail (*Limneus minutus*) and there form sporocysts. Similar cysts may be formed in other closely allied species, but no further development takes place. In the *Limneus minutus* each sporocyst produces a large number of offspring which undergo a change, and then leave the snail and lead an independent existence. In the water they appear to the naked eye as small whitish bodies, and they may encyst themselves on the stems of grasses, and in this later state are capable of surviving extremes of heat or cold, or even drying. In this stage the so-called cercaria may be ingested, either in the snail, in drinking water, or on vegetable food-stuffs. Having reached the digestive tract of man they obtain access to the bile ducts, where they attain adult size (about 30 mm.). They are nourished from the blood of the host, which they imbibe after attaching themselves to the mucous membrane. The ova are then deposited in very large numbers; the fluke dies, becomes encysted, or is excreted.

This life cycle was observed after it was found that the parasite was

¹ British Medical Journal, April 22, 1911, p. 931.

never found in sheep whose pastures were contiguous to the sea or salt marshes. Salt has been found an efficient prophylactic and is much used in veterinary practice.

From the recorded cases, it is somewhat difficult to draw a picture of the *symptoms*, but it would seem that the period of invasion may pass unnoticed clinically, the host being in good health. In some cases, however, there may be slight jaundice and moderate enlargement of the liver. In sheep the minimum duration of this stage is six weeks, and in man it is probably longer. This is followed by a stage of anemia coinciding with the maturity of the flukes. The anemia of the mucous membrane is very marked, but the general symptoms are those of toxemia, which are out of all proportion to the amount of anemia present. There is loss of appetite, irregular temperature, and frequent pulse. Pain in the gastric region, various intestinal disturbances, sometimes diarrhea and vomiting. In other cases constipation may be present. There is dyspnea. The patient then passes into the third stage, that of emaciation and ascites, an increase in the anemia, edema, and jaundice. If the patient survives this stage, he passes into the fourth and last stage, in which there may be slow recovery. There may be an increase of fibrous tissue in the liver, and permanent ill health. All sorts of symptoms may be caused by migration, and the flukes have been found in the lung, and even in the eye. In one case of a child, aged two months, there was an abscess of the scalp containing them, and in another instance the sole of the foot was affected. There is in the cases the eosinophilia.

The *diagnosis* rests upon five points. The discovery of the ova in the feces or of the parasites in any situation, the clinical signs, the eosinophilia, and the precipitin reaction. At present the precipitin reaction is perhaps only of theoretical interest.

The *prognosis* is not very favorable.

The *treatment* with ordinary anthelmintics is apparently of no value, since they are not excreted in the bile. Quinine and arsenic also seem to be without effect. Ward tried the use of euonymin, giving one-grain pills three times a day, his idea being to stimulate the secretion of the bile, with the idea that the toxic substances would be washed out and their absorption perhaps prevented. It would seem that the administration of bile acids or their salts would be a better method of accomplishing this, but it would be interesting to know if hexamethylenamin, which is excreted in the bile, would have any effect upon these parasites.

The eggs are oval in shape, and the greatest diameter may be midway between the two poles, but, as a rule, it is toward one end. The average length is 137μ and the average breadth 71.7μ . They vary in color from light yellow to dark brown, and stain deeply with iodine, but hardly at all with aniline dyes. Within the egg are a number of

spherical bodies. Finding the eggs in stools is one of the most important methods of diagnosis.

The *Entamœba Tetragena* as a Cause of Dysentery. Craig¹ has made a short report on this subject, in which he gives a valuable table showing the differential diagnosis between the three known species of entameba. Recent researches have shown that there are at least three species of ameba that are parasitic in the intestine of man. Schaudinn, in 1903, separated two species, one of which he called the *Entamœba coli*, and the other the *Entamœba histolytica*. The former he found in a large portion of healthy individuals, as well as in diseases other than dysentery. The latter he found in patients suffering from dysentery. Vierch, in 1907, described another form, which he called the *Entamœba tetragena*, which he found in patients suffering from dysentery contracted in Africa. As this newer species had certain things in common with the two species previously described, it has probably caused a certain amount of confusion in making the diagnosis. Craig found this organism in quite a number of cases of dysentery in the Philippines, and he believes that further study will demonstrate that it is a cause of a considerable number of intestinal infections of the Philippines, and possibly elsewhere.

The Treatment of Filariasis by Salvarsan. Paul M. and James T. Pilcher² report an interesting case of unilateral chyluria treated by an injection of "606." The patient was a white, married woman, aged thirty-five years, a native of British Guinea, where she resided until five years ago, when she came to Brooklyn. Seven months before the report, and some four years after she left the tropics, she began passing a milky urine, without any other subjective symptoms. The *Filaria sanguinis hominis* was found in the blood at night time, and 0.6 of a gram of salvarsan was given hypodermically. At the end of forty-eight hours the urine became perfectly clear. Suddenly, after the sixty-eighth to the seventy-second hour, the urine became markedly chylous, and contained large numbers of seemingly dead filariæ. After that time there was intermittent opacity, but no filariæ could be demonstrated.

Treatment of Yaws (Frambesia). Strong³ has used arsenobenzol (salvarsan) in the treatment of yaws. Yaws and syphilis were formerly believed to be manifestations of the same disease, but the views held by the majority of people at present are that they are two separate diseases, the disease being caused by the *Treponema pertenue* of Castellani. Up to the present time the treatment of yaws has been very unsatisfactory, but with the use of arsenobenzol remarkably good results have been obtained. A single injection has been sufficient

¹ Archives of Internal Medicine, March, 1911, p. 362.

² Medical Record, March 11, 1911, p. 434.

³ Journal of Experimental Medicine, April, 1911, p. 412.

so far, in the 25 cases treated, to bring about a cure, and no other form of local or general treatment was found to be necessary. The effects are very quickly seen, the granulomatous lesions beginning to grow smaller three or four days after the administration of the drug, and in from ten to twenty days they have usually disappeared entirely.

Nichols¹ has independently noted the good effects of arsenobenzol in yaws, and was able to reproduce the disease in rabbits by inoculation into the testes and was able to obtain a rapid cure for these lesions by means of a single injection.

Friedländer's Bacillus as a Cause of Septicemia. Friedländer's bacillus does not play any very great part in the pathological changes in man, although from time to time it is found in localized infections, particularly of the lung, nose, mouth, pharynx, middle ear, and sometimes in disease of the intestine and urogenital tract, the liver, and bile ducts. In any of these places it might cause an inflammation which may become purulent. In general infections, however, these organisms are rather rare.

Rolly² reports 4 instances from the clinic at Leipzig, and has briefly commented upon some of the other cases reported in the literature. In a great many cases the septic process has a starting point in the lung, but practically any of the above mentioned sites may be the starting point. In the 4 cases reported by Rolly, one case followed an infection of the uterus following an abortion in which there were also changes in the liver and bile ducts. Another case came from an ulcer in the sacral region following irritation of the vulva. One came from an inflammation of the middle ear, and the last case from an endometritis. In 3 of these cases, the organisms were found in blood cultures. This is another argument for the more frequent taking of blood cultures in all conditions which appear to be septic. There are few or no reports upon the examination of the blood in cases in which the lung is affected, and it is quite probable that, if systematic examinations were taken, Friedländer's bacillus would be found in some of the pneumonic cases.

The Complement Fixation Test in the Diagnosis of Gonococcic Infections. Schwartz and McNeil³ have made a study of this subject which was first suggested by Müller and Oppenheim, in 1906, and, as a result of their investigations, they conclude that different strains of the gonococcus differ markedly one from another, so much so that the antibodies produced in the body by the toxin of one strain will, in many instances, not bind the complement in the presence of an antigen prepared from another strain, so that if only one strain is used in the preparation of

¹ Journal of Experimental Medicine, vol. xii, p. 606; Journal of the American Medical Association, 1910, vol. lv, p. 216.

² Münchener medicinische Wochenschrift, January 3, 1911, p. 17.

³ American Journal of the Medical Sciences, May, 1911, p. 693.

the antigen, a great many negative results will be obtained in positive cases. Fortunately, an antigen prepared from many strains fixes the complement whenever one of its component strains does so, and consequently the necessity of testing a serum against a number of antigens separately is avoided. Of course, the antigens used probably do not contain all of the possible strains of gonococci, and consequently negative results will at times be obtained in positive cases. They have also tested the polyvalent antigen against the serum of animals immunized to the following varieties of bacteria: typhoid fever, dysentery, diphtheria, pyocyaneus, tetanus, streptococcus, and living and dead meningococcus, and all of these gave uniformly negative results. The only positive result was obtained with Flexner's antimeningococcic serum. They have not had an opportunity to examine the serum of patients suffering from cerebrospinal fever, but even if it should be a positive reaction, it would not detract from the practical value of the test, as there would be very little doubt about the diagnosis in such cases.

Hemoglobinuric (Blackwater) Fever. Craig¹ has presented a very clear account of the reasons why hemoglobinuria, or blackwater fever, should be regarded as a separate disease, and not a manifestation of malaria.

As early as 1892, Manson advanced the idea that blackwater fever was a separate disease, and more recently Sambon has awakened interest again in the specific theory of the disease. In this connection it is interesting to note that other diseases, such as kala-azar, have been reported as manifestations of malaria, or as manifestations of some other infectious disease, and subsequently have been shown to be due to some other parasite.

There are three principal theories regarding the etiology of hemoglobinuric fever. (1) That it is due directly or indirectly to malaria; (2) that it is due to quinine; and (3) that it is a specific disease. Each one of these has its enthusiastic supporters, but none of them rests on a firm foundation, although the last named would seem to be the true one.

The malarial theory is a very old one, and numerous facts are brought forth to support it. While it is true that the geographical distribution of hemoglobinuric fever corresponds to that of malaria, there are many malarious countries in which blackwater fever has never been noted, or where it has occurred with such rarity as to be regarded as a medical curiosity.

The number of cases and deaths from malaria in the Philippines, for example, is very large. In 1902, it was stated to be 118,476, or 26.8 per cent. of all the deaths, and yet not a single death is recorded as being due to hemoglobinuric fever. In the region in which the

¹ Archives of Internal Medicine, January, 1911, p. 56.

disease occurs, it may be limited to very small areas, or even to certain houses, and in some countries where it is now prevalent, it has only been recently observed, although malarial fevers have been present for centuries. It is usually stated that a long period of residence in an infected or malarious district is necessary before the disease occurs, and it is admitted that most cases of hemoglobinuric fever occur after the first twelve months of residence in the infected districts, but there have been instances recorded in which the disease occurred in individuals within four or five weeks after their arrival in the infected locality, and there are a number of instances where it occurred after two or three months' residence, and these individuals have previously not resided in a malarious country. Then, too, it has generally been regarded that in all cases of hemoglobinuric fever the individual had previously suffered with malaria, but this statement is only made by those unfamiliar with the literature of the subject, as there have been numerous cases reported in individuals who had never had malaria.

The malarial parasite is usually found in the blood of these individuals, but this does not prove anything, as the same might be said of kala-azar, malta fever, and even sleeping sickness. In each of the above, the fixed idea that the disease was a manifestation of malaria, delayed the discovery of the true cause.

Craig collected 273 cases from the literature, of which 109, or 40 per cent., showed the malarial plasmodia in the blood, and there are numerous cases on record in which the malarial parasites were not found at all.

As regards the quinine theory, it was first suggested by Veratas, a Greek physician, as early as 1858, and the fact that this view was supported by Koch has been regarded as almost conclusive proof of its truth; but, as a matter of fact, there have been many instances of hemoglobinuric fever in individuals who have never taken quinine, and, on the other hand, there are thousands of individuals who take quinine more or less regularly for years and never develop the disease except in regions where hemoglobinuric fever is endemic. It must be remembered that quinine may produce hemoglobinuria in some individuals, but in such individuals the symptoms always follow the administration of the drug, and may occur in regions where hemoglobinuric fever is unknown, and further, these cases do not present the classical symptoms of blackwater fever.

The third theory that the disease is a specific one, has many points in its favor, among which may be noted the geographical distribution of the disease and also the fact that, while it may be more or less common in certain malarious districts, there are others in which it is exceedingly rare, or unknown. Also the fact that it occurs in epidemics is very important. The symptomatology is unlike that of any form of malarial fever, as there is a lack of periodicity in the temperature curve, the

presence of a large and tender liver, repeated chills, recurrence of marked jaundice, leukocytosis, and hemoglobinuria. Relapses are always attended by the same train of symptoms, while the relapses of pernicious malaria are not always accompanied by the same symptoms. The most striking pathological feature is the necrosis of the Malpighian bodies of the spleen, which were spoken of by Whipple, and it must be noted in passing that he regarded the disease as a manifestation of malaria. The fact that the parasite has not yet been described, of course, means nothing. There has been a piroplasma described by Miyajima in the blood of cattle in Japan, and Crawley has described a trypanosome in the blood of American cattle. In both instances, the organisms were present in such small numbers that they could not be demonstrated in the blood with the microscope, but, if the blood were added to a suitable culture media, the organism could be secured in a pure culture. The same may be true of hemoglobinuric fever, and, curiously enough, Craig could find no evidences in the literature of any attempt to make blood cultures.

The fact that hemoglobinuric fever resembles Texan fever in its symptomatology has often been noted, and it is possible that it may be due to a similar parasite, and it is rather a significant fact that the piroplasma infection has been observed in almost every region in which blackwater fever is endemic.

Hookworm Disease. THE ROCKEFELLER SANITARY COMMISSION, AND THE ERADICATION OF THE HOOKWORM DISEASE. One of the most remarkable experiments on a large scale in the stamping out of a disease, which amounts to a veritable plague, has been undertaken in this country by the Rockefeller Sanitary Commission. The work and the results obtained by this commission will be watched with peculiar interest. Never before in the history of the world has a similar medical movement been financed, planned, and undertaken. Some brief account of this work will be of particular interest, and the following is gleaned from the reports of 1910 of the administrative and scientific secretaries.

The commission was created for the definite purpose of eradicating the hookworm disease, and to do this it was necessary to undertake three definite tasks. (1) To determine the geographical distribution of the infection, and to make a reliable estimate of the degree of infection for each infected area. (2) To cure the present sufferers. (3) To remove the source of infection by putting a stop to the pollution of the soil.

It has been determined to use the state as a unit of organization and of work, and so far as possible this will be carried out through existing agencies, the public health departments, the organized medical profession, the public press, and the public schools. In addition to these four fundamental agencies, a number of minor agents will be utilized. The States in which the infection was found, and in which the work has already been begun are: Virginia, North Carolina, Georgia,

South Carolina, Tennessee, Arkansas, Mississippi, Alabama, and Louisiana.

The state public health authorities and the Rockefeller Commission jointly appoint an official to look after the work, who is referred to in the report as the state Director of Sanitation, although the title varies in some of the states to conform to state usage. Under his direction a field force of sanitary inspectors undertake the work to determine the geographical distribution and degree of infection, the sanitary conditions which are responsible for the presence and the spread of the disease, and to enlist the coöperation of the physicians in curing patients already infected, to provide for the treatment of the poor, to inspect the schools, to instruct the teachers, to enlist the coöperation of the press, and by lectures and demonstrations and personal conference, to teach the people the importance of getting all infected persons cured, and how to prevent the spread of the disease by putting a stop to soil pollution.

As the definite diagnosis of the hookworm disease requires a microscope, for the examination of the patient's stools, it is necessary to have a laboratory, and each state has offered to make this examination free of charge. One person can make from 20 to 35 such examinations a day.

Some idea of the growth of the work may be obtained from the fact that in the North Carolina State Laboratory ten months ago there was no special staff needed for this service. There are now five men devoting their whole time to the examination of specimens, and the services of two additional men are needed to keep up with the work.

In each state the work has been carried out in the following manner: First, an effort has been made to determine the geographical distribution of the infection, and to estimate the degree of infection for each area. This was made by counties, and estimates were roughly made as to whether the infection was "heavy" or "light," and subsequently a survey more in detail is made, which estimates what percentage of the total population is infected.

The first tour of inspection made by the State Director includes consultations with physicians, the examination of suspected patients, and the general observation of the children in the schools, and of the people. Reports from local physicians are asked, and personal letters are sent to all physicians, and, as physicians become educated in the diagnosis and treatment of the disease, their reports increase in number. For example, in North Carolina there have been reports of about 8000 cases treated by physicians in 94 out of the 98 counties in the state. The results of the investigations are recorded particularly upon maps showing the distribution and the degree of infection. This includes the results from the examination of miscellaneous specimens as well as the systematic investigation of college students, state regiments, and children in institutions. One public school was selected at random in

each district in the county, and specimens from all children in each school selected. The results show an average infection of 82.6 per cent. for all schools examined.

To get thorough information concerning the number of cases and sanitary conditions of any state will require years of work, but the indications show that this will eventually be done. So far the infection has been studied in nine states and the disease has been demonstrated in other states as well. The Commission is also getting information on conditions in foreign countries.

The task of curing those persons suffering with the disease at present is accomplished in three ways: By enlisting the services of the physicians; by educating the people to seek examination for treatment if needed for themselves and for their neighbors; and, lastly, in providing for the treatment of the poor. The state depends upon the physicians to treat all cases just as it depends upon them to treat other diseases, and this involves an enormous task. As the disease is comparatively new as regards our knowledge of it, most physicians are not instructed concerning it. Efforts have been made to furnish information by means of bulletins, letters, lectures, and demonstrations, and by personal visits of the sanitary inspector, giving demonstrations and diagnosis and treatment when the physician desires it.

The final task is to stamp out the hookworm infection by putting a stop to soil pollution. This is largely a matter of education, and will require years for its accomplishment. The state organization endeavors to get a sanitary survey, and then to teach the people, particularly by public lectures, bulletins, and newspapers, and also through the schools. The work in the schools is of particular importance. This includes teaching the school children the dangers of soil pollution and how to avoid them, and also the building of sanitary privies for all of the schools. This work is being pushed very systematically.

The scientific side of the work which has been carried on by C. W. Stiles has consisted in experiments and investigations dealing with the problems of how long the hookworm lives outside the body, the comparison of the various drugs used for treatment, the safe disposal of night soil, and the statistics of soil pollution on farms. The results of the viability experiments are noted below. It may be added that it is not entirely safe to assume that the sand under and around a privy is entirely free from hookworm infection until five months after the privy was last used. It seems very probable that if the fecal material containing hookworm eggs is subjected to decomposition in water for about three months, all hookworm eggs will be dead. It has also been determined that the action of chloride of lime in a strength approximately $\frac{1}{4}$ of a pound to $10\frac{1}{2}$ quarts of water for 22 to 40 hours does not kill hookworm eggs.

Flies, perhaps, play an important role, inasmuch as if fly-blown fecal

material is buried, the flies will crawl to the surface and complete their development.

The report of the work on the experiments with drugs has not yet been completed.

THE TREATMENT OF THE HOOKWORM. Strosnider¹ summarizes the methods used in the treatment of the hookworm.

Skin lesions or ground itch in the papular or vesicular stage may be treated by painting with 5 per cent. salicylic acid in collodion. In the pustular stage the wound should be cleansed, cauterized with silver nitrate, and then a dry dressing of 5 per cent. boric acid and zinc oxide ointment applied daily. If there is very much swelling, hot applications may be used, and the itching is usually allayed by 5 per cent. salicylic acid in zinc oxide ointment. The diseased parts should be covered to prevent scratching or rubbing.

Internally, the treatment, if there has been ground itch noted, should be begun on the fifteenth day, and should be repeated once, and the stools should then be examined at the end of six and twelve weeks, and if eggs are found, the treatment should be repeated. Large doses of salts should be used, and Strosnider prefers sodium sulphate. Thymol is then administered, and Ashford and King give the following table of doses to be regulated, in case of children, rather by size than actual age:

	Grains.
Under five years	7½
Five to ten years	15
Ten to fifteen years	30
Fifteen to twenty years	45
Twenty to sixty years	60
Over sixty years	30 to 45

Two grains per year up to the age of thirty years may be administered in two equal doses two hours apart. If there is great weakness or extreme anemia, severe diarrhea, cardiac depression, pregnancy, or dropsy, smaller doses should be used. Thymol may be given in wafers or capsules, and is best mixed with an equal quantity of sugar or milk to prevent its caking, or it may be given suspended in mucilage or syrup of acacia or some simple syrup. The patient should lie on the right side, and refrain from drinking much water so as to prevent vomiting. After two or three hours another brisk purge of salts, never castor oil, should be given to prevent the absorption of the thymol. The patient should remain in bed until the thymol is passed. If the patient is weak, or faint, or there is a burning sensation in the stomach, a little warm coffee may be given. Strosnider suggests the treatment being repeated once a week until the examination of the stools shows neither worms nor eggs. Oils and fats, such as butter, cream, or milk, should

¹ Journal of the American Medical Association, April 8, 1911, p. 1024.

not be given during the treatment, and neither patent medicines nor beverages containing alcohol. If toxic symptoms should arise from the thymol, they may be relieved by the use of morphine and atropine, strychnine, or digitaline subcutaneously, or hot coffee per rectum. Artificial heat may be used if necessary. If large amounts of thymol are absorbed it is liable to cause depression, headache, weakness, dizziness, tinnitus, nausea, rapid, weak pulse, sometimes profuse sweating, and subnormal temperature. It may sometimes cause epigastric pain, nausea, and vomiting, with more or less diarrhea.

THE USE OF EUCALYPTOL IN THE TREATMENT OF HOOKWORM. Borini¹ has suggested the use of a mixture of eucalyptol, 2 grams; chloroform, 3 grams; castor oil, 40 grams. This is taken in four doses within the space of an hour, under the usual previous precautions regarding diet and laxatives. He found that it was well borne, is not dangerous, and did not produce any disagreeable symptoms, and at the same time was most efficacious. This method of treatment was suggested some years ago by Herman and Cavenaille.

Infectious Jaundice. The symptom-complex known as Weil's disease or epidemic catarrhal jaundice has been known a long while, and it is quite probable that several infections have been grouped under this one head. The cases described by Weil in 1886 occurred mostly in butchers. It is not infrequent to find localized epidemics in armies and in barracks, and a recent small epidemic occurred in July, 1910, at Hildesheim, and was reported by Hecker and Otto.² Some 20 cases were observed, the clinical history of the disease being that soldiers previously in perfect health were taken suddenly with dizziness, pain in the head, neck, and lumbar region, nausea, high fever, and a relatively slow pulse. Most of the patients vomited bile, and the urine contained albumin. As a rule, there was constipation, which had been preceded by a diarrhea. In almost all the cases the liver was definitely enlarged, but the enlargement of the spleen was rather variable, and in some was not noted at all. Certain symptoms were noted which were not present in all cases, and among these there were marked jaundice, nose-bleed, weakness of the heart, and hematuria. They believe that Weil's disease occurs almost exclusively in the warmer months, and that it is not transmitted to those about the patient. The infection shows a distinctly limited area, and the cause of the disease is not known. They believe that it is quite possible that the cause may be a microorganism or possibly an invisible virus, which is capable of developing outside of the body, and which is carried from individual to individual by means of some insect. The symptoms are rather characteristic, but at some time, particularly at the beginning and at the end of the epidemic, there may be considerable variation in the mani-

¹ Il Policlinico, Sezione Pratica, June 16, 1911, p. 913.

² Deutsche medicinische Wochenschrift, May 4, 1911, p. 820.

festations of the disease. They also note the observations of Tedeschi and Napolitani.¹ These observers have described in Italy a disease occurring in the soldiers in summer under the name of *male della secca*. This disease they were able to transmit to monkeys and to men by injections of filtered blood, and also indirectly by means of papataci, a variety of small gnat (see Pappataci Fever) which had been allowed to feed upon the blood of patients ill with the disease.

Transmission of the *Leishmania Infantum* to Dogs. Nicolle recently described his finding of this parasite in kala-azar of infants in Tunis, and also found that many of the street dogs of that city were infected with the same parasite. Jemma, di Cristina, and Cannata² have been able to infect dogs directly by intraperitoneal, intravenous, and intraspinal injection of the blood from the spleen, liver, and emulsion of the bone marrow of a child that had died from kala-azar. Six out of 9 dogs were successfully infected, and they suffered from anemia and cachexia, and degenerative changes were found in the organs. The parasites were found in very large numbers in the liver, spleen, and the bone marrow.

Malaria. MALARIA IN PANAMA. Brem³ has made a study of this subject, several points of which are of considerable interest.

The first point which he brings out is in regard to *the time of the malarial paroxysms*, and the great majority of them, both in the estivo-autumnal and tertian forms, occur between the hours of 8 A.M. and 8 P.M., and two-thirds of them between 12 M. and 8 P.M. This agrees with the observations made by Craig and also by Koch, and is in opposition to the observation made by Trousseau and also by Manson, in regard to the differential diagnosis between malaria and liver abscess, the statement being made that the fever in the latter generally, though not invariably, occurs in the afternoon or evening, while in malaria the paroxysm may, and generally does occur later in the day. It must be noted that the time the paroxysm occurs should have comparatively little weight in making the diagnosis.

Various *methods for the administration of quinine* were tested, the idea being to get the maximum results with the minimum expenditure of time and labor, these latter being of importance where large numbers of patients are treated.

The first method consists of giving 30 grains daily in 3 doses of 10 grains each, at 6, 8, and 10 A.M. The second, 30 to 40 grains daily, given in 5-grain doses every four hours, with two extra doses of 5 grains each, given in obstinate cases before the approximate time for the onset

¹ Centralblatt für Bakteriologie, 1911, vol. xxxvii, Heft iii.

² Centralblatt für Bakteriologie und Parasitenkunde, Abt. 1, 1910, Band lvii, Heft 1.

³ Archives of Internal Medicine, December, 1910, p. 646.

of the paroxysms, at 10 A.M. and 2 P.M. The third, 20 grains daily, two doses of 10 grains each at 6 and 8 P.M.

The febrile period was approximately equal under the first two methods, and was much longer under the third method, so that, all things considered, the first is to be preferred in the treatment of the ordinary infections in adult males.

In using *quinine as a matter of diagnosis*, the drug should be given according to the first or second methods in the case of male adults, and in others the quantity should be regulated by the weight of the patient. In first attacks of malaria the fever of 2 out of 3 estivo-autumnal infections will reach and remain normal within three days. If a marked remission and a much-decreased fastigium do not occur on the fourth day the fever is not malarial, and quinine may be discontinued. If a remittent or intermittent fever continues unabated for more than four days, it is not of malarial origin. First attacks may show mild or rudimentary paroxysms of fever for six, seven, or eight days. Ordinarily one should be able to draw conclusions from the test in four days or less, though rarely six days may be needed. In secondary attacks of malaria, fever usually ceases within three days, and a remittent or intermittent fever that proceeds unabated for three days is not malarial. Four days is the maximum time to persist in the test. All tertian infections are controlled within three days.

Great care must be used to insure the absorption of quinine, and during the test the patient should be kept at rest in bed.

Chronic malaria and *malarial cachexia* are terms which are very much abused, as they describe a condition and not a disease. If the parasite cannot be discovered, and if other diseases are excluded by careful examinations, the quinine test should be used in malarious regions. If an anemic condition is due to malaria, a partial immunity or tolerance has been acquired, and quinine causes a rapid cessation of fever and other symptoms. If these do not disappear within three days, or if the anemic condition does not improve rapidly, malaria is not the origin of the trouble, and another diagnosis must be sought.

One should bear in mind, in this connection, the possibility of chronic malarial infections in individuals who acquire the disease in one part of the country and then travel to a non-malarious district.

An individual acquires a partial immunity or tolerance from malarial poison after the first infection; the febrile period, and the febrile symptoms decrease markedly after the first attack, remain stationary in the second, third, and fourth attack, and then undergo another marked decrease.

TRANSMISSION OF MALARIA IN PANAMA. Darling¹ has continued his studies of this disease in the Canal Zone, and believes that the principal

¹ Annals of Tropical Medicine and Parasitology, 1910, vol. iv, p. 2.

agent of inoculation in that region is the *Cellia albimani*, which is the most common mosquito found in that locality. Darling has also confirmed the observation that blood is a necessary part of the nourishment for mosquitoes, and has noted that the ovaries do not develop in females receiving only exclusive vegetable food.

A NEW DIAGNOSTIC SIGN IN MALARIA. When Lavarán first discovered the parasite of malaria in the blood, it was thought that the difficulties of diagnosis of this disease would be overcome; but it was soon found that the parasite could disappear temporarily from the superficial circulation, and that it did this uniformly if quinine was administered. At other times, the parasite is found to be localized in the spleen or other internal organs, and, in the latent and chronic forms, it is also exceedingly difficult if not impossible to discover the parasite.

In 1908, Plehn, of Berlin, made a communication to the British Medical Association, in which he thought that the presence of urobilinuria was of great value in the diagnosis of malaria, and Urriola,¹ physician to St. Thomas' Hospital at Panama, suggested the examination of the urine for blood pigment. His method consists of centrifugalizing the urine and examining the sediment under the microscope, and it is usually more or less easy to discover the pigment which occurs in small grains, some larger masses, and sometimes enclosed in hyaline masses. In many different fevers pigmented granules are found in the urine, but Urriola believes that these are always reddish or yellowish, or not a very dark color of black, while in malaria the pigment is of the intense coal-black color, the same as is seen in the parasite. He has found it to be constant in the blood and in the urine, and he has not found it present in any other disease except malaria. He has had considerable experience, and has been able to make the diagnosis in cases in which the ordinary methods failed. He believes it to be a pathognomonic sign of greater value than the finding of the parasite on account of its being found in all cases. If this is true, it is another great advance in tropical medicine.

THE PARASITE OF THE ESTIVO-AUTUMNAL MALARIA. Last year I² noted the observations of Craig, and this year one of the best contributions to the subject is the admirably illustrated article of Mary Rowley-Lawson.³ The observations have been made upon the various forms of the parasite, and the sexual cycles, and she was able to demonstrate the sexual cycle in the circulating blood of man. The observations of Craig, that there are two distinct types of the estivo-autumnal crescents, was not confirmed. The author believes that the crescentic parasite is throughout its entire existence extracellular, that is, not within the

¹ *La Semaine Médicale*, January 4, 1911, p. 3.

² *PROGRESSIVE MEDICINE*, March, 1911, p. 149.

³ *Journal of Experimental Medicine*, 1911, vol. xiii, No. 2, p. 263.

substance of the red corpuscle, but attached to its surface, and that it develops from the small ring-form parasite.

The sexual cycle of the crescent may occur in the circulating blood of its human host. It is probable that this cycle is very rapid, but practically the whole of it can be seen in a few smears taken from one puncture. "The microgametocyte, or male, develops a flagellum (microgamete), which, after the parasite has assumed the crescentic phase, leaves the body of the parasite and enters the body of the macrogamete, or female, during its existence as a round body. Fertilization is then accomplished."

The microgametocyte subsequently degenerates and probably dies. The macrogamete, after being fertilized, becomes crescentic, passes into the reproductive phase, and undergoes sporulation, the product of which appears to be the small ring-form parasite.

The reason that the sexual cycle is not seen oftener in the circulating blood of man, is thought to be due to the fact that the process of reproduction is exceedingly rapid, and that the cycle probably usually takes place in some of the internal organs, and that it only occasionally occurs in the peripheral circulation.

The reader is referred to the original article, both for the details and for the excellent photomicrographs which accompany it.

James¹ has criticized the above findings rather severely, calling attention to the improper interpretation of some of the staining reactions and also the so-called flagellation described is not a process of flagellation, but a description of the reduction of the chromatin of the macrogamete. There are numerous other criticisms which are too technical to be entered into at this time.

THE RADICAL CURE OF MALARIA. Harris² has contributed another article on the importance of malaria, and called attention to the fact that, while the treatment of malaria is usually satisfactory, relapses are very common. Often these relapses occur after long periods of time. Harris believes that a campaign of education should be undertaken, and that Koch's method of having every person with the disease take quinine sufficiently long to be completely cured should be instituted.

It is man and not the mosquito that carries the malaria through the winter, and thus perpetuates the disease. Koch, as will be remembered, was able to stamp the disease out of certain South African villages by the administration of quinine to the inhabitants. There must, however, be some other host than man for the malarial parasite, as most virulent forms of malaria are acquired in regions uninhabited by man, and though perhaps exact knowledge on this point is wanting, it certainly is the prevailing impression. Harris does not mention this

¹ Journal of Tropical Medicine and Hygiene, July 1, 1911, p. 193.

² Journal of the American Medical Association, November 26, 1910.

feature of the disease, and it would be most interesting to have his views on it.

The question of the administration of quinine is of great practical importance. Various methods have been used, but the one which gives the best results for the average practitioner is that recommended by various tropical experts, including Gorgas, Deaderick, Craig, and Rogers. This consists of keeping the patient continuously under the influence of quinine by giving him small doses every four hours, both day and night, with an extra dose four hours before the expected paroxysm. In the tertian and quartan forms, 3 or 4 grains every four hours are sufficient. In the estivo-autumnal variety, 5 grains every four hours will be required. This amount should be continued three or four days after the fever has disappeared, and then half the quantity should be given for two weeks. In the estivo-autumnal variety, the quinine should be kept up for several months. Deaderick suggests the use of quinine in 15-grain doses on two successive days of each week for this period, while Ross states that four months' time is the proper limit. Harris also urges the distribution of quinine to indigent sufferers from malaria, and the destruction of the anopheles mosquito.

THE FORMATION OF A RACE OF PARASITES OF MALARIA RESISTANT TO QUININE. Neiva¹ has reported an interesting experience with malaria in a number of workmen employed in the construction of a railway at Xerem, which is a swampy country some 1500 miles from Rio Janeiro. In spite of giving doses of quinine as a preventive, there still continued to be cases of malaria, and Neiva is of the opinion that there developed a resistance to quinine due to the fact that in the earlier days the dose consisted of 0.5 gram given every third day, and subsequently every second day. He believes that many parasites grow up in blood containing some quinine, but not sufficient to prevent their growth, and this eventually led to the production of parasites more or less resistant to the drug.

It is an exceedingly interesting observation to know that, with certain arsenic preparations, trypanosomes acquire a remarkable tolerance for arsenic, so that it is impossible to influence them with the drug.

TREATMENT OF MALARIA WITH SALVARSAN. Iversen and Tuschinski² have reported their experiences with salvarsan in malaria. This was briefly mentioned in *PROGRESSIVE MEDICINE* for March, 1911, p. 114. They mention also the work of Werner and Nocht. These latter observers found that tertian parasites disappeared very rapidly from the peripheral blood after the use of salvarsan, and Werner, in estivo-autumnal cases was only able to produce a transitory effect. One dose, 0.6 gram, was sufficient to free the peripheral blood from parasites, though after a few days the parasites and the fever returned. Werner

¹ *La Semaine Médicale*, January 11, 1911, p. 18.

² *Deutsche medicinische Wochenschrift*, January 19, 1911, p. 107.

suggests the use of salvarsan in cases of individuals who cannot take quinine, and also in those cases in which the parasites have acquired a certain amount of resistance to the remedy.

Iversen and Tuschinski claim that salvarsan in one dose of 0.5 gram, given intravenously, exerts a specific action on all forms of malarial parasites, that the tertian forms disappear in most cases in from twelve to forty-eight hours after the paroxysms cease. They do not state whether or not the results are permanent. They suggest, however, the combination of the intravenous and intramuscular methods of administering the drug. In the quartan variety the results of the drug given in doses of 0.8 are not permanent. In estivo-autumnal forms the doses of 0.5 to 0.8 result only in a temporary disappearance of the parasite from the peripheral blood, and only of the ringed forms. The crescents do not disappear, although they may change their form and color. In some forms of the estivo-autumnal malaria they got a so-called contrary effect, in which, after a temporary lessening of the fever and complete disappearance of the ringed forms from the peripheral blood, there is a marked impairment of the general condition, and a return of numerous ringed forms and crescents.

Fulchiero¹ has given his experiences with the use of salvarsan in malaria, and he advises its use in those cases which apparently resist quinine, and also in those cases in which there exists an individual idiosyncrasy for quinine. He believes that it is the best drug to use in the treatment of some of the pernicious cases, especially when there are a very large number of organisms present in the blood in different stages of evolution. In his experience it is in these cases that the action of salvarsan is most intense and rapid, and in which the most brilliant results are obtained. He believes that in the cases in which there is considerable cachexia, and in which the life of the individual may be threatened, that the drug is of considerable service, and he suggests that in the quartan variety salvarsan and quinine might be used to advantage at the same time.

Malta Fever. Malta or Mediterranean fever has been noted from time to time in the various seaport towns in America, the cases having been imported from Europe, and Bruce states that the disease occurs in the Mississippi Valley, but failed to state the source of his information. He also relates the cases which occurred in 1905 on the steamship Joshua Nicholson. Sixty-five goats were shipped on this boat at Malta, and during the voyage the milk was drunk by the captain and many of the crew, with the result that an epidemic of Malta fever broke out on board of the vessel, and almost everyone who drank the milk became infected. After the goats reached America, they were placed in quarantine, and a woman who drank some of the milk also had the fever.

¹ Il Policlinico, Sezione pratica, October 8, 1911, p. 1296.

I believe that a study of the prolonged fevers in the goat-raising districts in the United States will show a widespread existence of Malta fever, and the recent reports of the occurrence of the fever in Texas are of particular interest to physicians, and especially to health officers.

Ferenbaugh¹ has reported 4 cases in young men, aged from eleven to twenty years, who were seen in the Pecos River country. It has been known in this region that there were cases resembling typhoid, of long duration and of low mortality, and a study of these cases showed a positive agglutination test with the *Micrococcus melitensis*. All of these patients had worked at a goat camp, drinking the milk from the herd, and some of the animals had what was called locally "goat fever."

Subsequently there have been three further reports by Gentry and Ferenbaugh.² Both of these observers are lieutenants in the medical corps of the United States Army, and their first paper deals with the report of the disease in 2 patients, and the second paper reports several new cases and contains a map of the goat raising section of Texas, which also represents the area of the country in which Malta fever is endemic.

The raising of goats has increased considerably, especially in Texas, and the disease, according to the observers just quoted, is endemic in all of the older districts.

Monkeys living in close contact with infected monkeys take the disease, probably by having their food contaminated with urine, and possibly by eating parasites containing blood.

The disease, as suggested above, is transmitted to man from the goat, the transmission being by means of drinking infected milk. It was found that apparently healthy goats may have the organism growing in their blood, and it was estimated that 50 per cent. of the goats in Malta were affected, and 10 per cent. were actually secreting the *Micrococcus* in their milk.

It has been shown that the disease attacks people in all walks of life. At the Naval Hospital in Malta almost every patient entering, and remaining for any length of time, contracted the disease in spite of the excellent management, and it was also shown that officers were affected about three times as frequently as the private soldiers. In 1906, measures were taken in Malta to prevent the spread of the disease, and there was about one-tenth the number of cases as compared to previous years. In the Naval Hospital, above alluded to, the use of goats' milk was forbidden, and from that time no cases have developed in the Hospital.

The *symptoms* of Malta fever vary considerably. Briefly, it may be

¹ Journal of the American Medical Association, August 26, 1911.

² Ibid., September 9, 1911, p. 889; September 23, 1911, p. 1045, and September 30, 1911, p. 1127.

stated that there is a continued fever of long duration, frequent relapses, profuse perspiration and constipation, rheumatic or neuralgic pains, swelling of the joints and orchitis. There may be also enlargement of the spleen. This curious lot of symptoms leads to the disease being mistaken for other conditions. For example, a very instructive instance is noted by Villanova.¹ The patient was admitted to the Hospital at Zaragoza, having previously been in hospitals in Huesca, Lérida, and Barcelona. The first diagnosis made was fever, a local term being used to describe the general attack. It was then discovered that the patient was suffering with orchitis, and pains in his shoulders and legs, and a diagnosis was made first of gonorrheal arthritis, which was subsequently changed to that of subacute rheumatism. Subsequently the patient suffered with sciatica, a coryza, and cough, and another diagnosis of la grippe was made. In Lérida he had an infarct of the spleen and nose-bleed, and a diagnosis of typhoid fever was made, and the patient was treated with cold baths. Soon after the diagnosis was changed to paratyphoid. The patient then went to Barcelona, where his trouble was diagnosticated as chronic malaria, and leaving that hospital for another where, after an examination by the x-rays, he was said to have a pleuritic effusion on the right side, and his fever was thought to be due to septic absorption. The patient made his escape when an attempt was made to do a paracentesis, and made his way to Zaragoza, where the diagnosis of pulmonary tuberculosis was made, and finally he entered the hospital where the correct diagnosis was established.

Some of the chief points in the clinical *diagnosis* may be noted. From *rheumatism* it presents the difference that sodium salicylate or aspirin is of no value in Malta fever. In subacute cases of rheumatism, which may easily be confounded with it, the difference is that in Malta fever the spleen is always very much enlarged. La grippe or influenza has often been confused with it, and the clinical differences are chiefly as follows: In influenza the onset is sudden, while in Malta fever the onset is slow. In most cases of influenza there are symptoms referable to the respiratory tract, which is not the case in Malta fever, and those which are present are either bronchitis or bronchial pneumonia without any previous coryza. The general appearance of the influenza patient dates from the onset of the disease, while in Malta fever the slow onset does not show any definite clinical picture for some time. An enlarged spleen is rarely present in influenza, and, if present, the enlargement is not very great. There is also no involvement of the testes. From influenza and also from typhoid and paratyphoid, in fact from the other febrile conditions, the diagnosis is best made by agglutination tests or by the hemolytic reaction. The diagnosis may, perhaps, best be made by finding the micrococcus in the blood. This may be done by withdrawing

¹ La Clinica Moderna, Zaragoza, June 15, 1911, p. 340.

the blood from a vein in the arm or by using Zammit's method, which is useful when the patient objects to having the veins punctured. The finger or the lobe of the ear is thoroughly cleansed and rendered as aseptic as possible by the use of alcohol, and when the skin is perfectly dry a puncture is made, the first drop of blood being removed by sterile cotton. A number of sterile capillary tubes 1 mm. in diameter are used, and as soon as a drop of blood appears, one of these tubes which is held in sterilized forceps is brought in contact with it, and when full it is immediately dropped into the culture tube. The agglutination test is useful, but the blood should be used in sufficient dilutions, such as from 1 to 20. The agglutination test may be made similar to that used for the typhoid test, or it may be made satisfactorily with suspensions of the dead micrococcus in normal salt solution preserved by the addition of small quantities of formaldehyde. Tests may be made either in a small tube or may be made directly on a slide after the manner of the rapid diagnosis of typhoid fever as suggested by Bass and Watkins. (See Typhoid Fever.)

The *treatment* of Malta fever is not particularly satisfactory. In a general way the treatment is similar to that used in typhoid fever, particular attention being paid to the diet and to the general hygiene of the patient. Naame¹ has suggested the use of 40 or 50 drops a day of a 1 to 1000 solution of adrenalin. Various coal-tar preparations and the salicyl derivatives have also been used, but beyond their relieving the pain from time to time, apparently have no effect upon the disease.

A LABORATORY INFECTION OF MALTA FEVER. A case of contagion² from this fever occurred in Lyons in one of the workers in the laboratory in April, who was working with a culture of the *Micrococcus melitensis*, and in the first ten days in May was taken with a fever which lasted two months. The Widal tuberculin test was negative, as was also the serodiagnosis for tuberculosis. The micrococcus was recovered from blood cultures, and positive results obtained by serodiagnosis. This shows the importance of observing all the precautions to prevent infection in handling cultures of bacteria, both those which are known to be easily transmitted and the others as well.

Experimental Measles in the Monkey. Anderson and Goldberger³ have made a series of observations of remarkable interest.

Measles has not received quite as much attention as have the other infections, and the number of experiments that have been made in the past have been comparatively few. Chavigny, in 1898, reported a case of measles in a monkey which had been in close contact with a human

¹ *La Presse Médicale*, March 4 and May 20, 1911.

² *Il Policlinico, Sezione Practica*, March 12, 1911, p. 345.

³ *Public Health Reports*, June 9, 1911, p. 847; June 16, 1911, p. 887; *Journal of the American Medical Association*, July 8, 1911, p. 113; August 5, 1911, p. 476, and September 16, 1911, p. 971.

case of measles in the person of its keeper. Josias made a number of attempts following this, to infect monkeys with the disease, but without any positive results. In one of his experiments he allowed a monkey to play about a measles ward for six months without the disease developing in the monkey. Grünbaum, in 1904, reported his experiments in which he attempted to produce the disease in two chimpanzees. He concluded that he may even have conferred immunity rather than have conveyed infection. Hektoen, as is well known, succeeded in producing the disease in man by injections of blood drawn directly from the veins. As far as is known all the other animals are immune to measles, although careful experimental work may show this to be an error, as the experience of Anderson and Goldberger show that results were often negative or extremely variable in the monkeys used by them.

The animals used were the Rhesus monkeys. The blood was taken from undoubted cases of measles, defibrinated, and injected into the monkeys, using various sites for the injection. In all, they inoculated 9 monkeys from 4 different cases of measles. Broth cultures made from the blood of all 4 cases appeared to be sterile. Inoculation was made into the peritoneal cavity, subcutaneously under the dura and into the heart. Only 4 of the animals gave any very significant reaction. Various quantities of blood were used, usually 10 c.c., but a positive reaction followed 2.5 c.c. in one animal, and 3.5 c.c. in another. The disease could be transferred, although with some difficulty, from the original monkey by using the defibrinated blood. The results are rather variable. The typical positive result they have described as follows:

"Ten days after inoculation some three or four coppery papules about 3 to 4 mm. in diameter appeared on the scalp, one under the left side of the jaw, and some three patches on the abdomen. Of the latter, one was about 1 cm. in diameter, not raised, and slightly scaly. Within two days the eruption had extended to the limbs and back, and the lesions, pale, rose-tinted maculopapules, had greatly increased in number. On the third day after the eruption appeared, the lesions on the scalp and face were perceptibly less bright, though the eruption on the abdomen appeared more abundant. From this time the eruption faded progressively until on the sixth day after its appearance there were left only barely perceptible stained patches. Scaling was observed only on some of the stained areas left by the lesions on the scalp and temple."

The disease in the monkey was marked by the temperature which reached its height in four days, at which time the first appearance of the eruption was noted. The temperature oscillated between 40.6° and 40.9° C. for three days, then dropped abruptly in the night from 40.8° to 39°. The temperature curve in various animals varied some-

what both in intensity and duration, but this, of course, is true of ordinary measles in the child.

The observers note the previous erythema about the orbits and purplish red papules on the lids, but fail to make any observation upon the appearance or non-appearance of Koplik spots, or of the eruption on the mucous membranes, a point, it would seem to me, of very great clinical importance.

In some of the animals there was sneezing and cough, showing involvement of the mucous membranes of the respiratory tract. The period of infectivity of the blood has been investigated by the same observers. It will be remembered that Hektoen, in 1905, found that the blood was infective thirty hours after the first appearance of the rash, but it should be borne in mind that he was working with an exceedingly susceptible animal, that is, man, and it is possible that the period of infectivity may be somewhat longer for man than for monkeys. It would seem that the blood begins to be infective just before the appearance of the eruption, and it continues for about twenty-four hours after the eruption comes out. Twenty-four hours after the first appearance of the eruption, the infectivity of the blood of the Rhesus monkey appears greatly reduced, and it becomes progressively less thereafter. The existence of a more or less definitely limited period of infectivity of the blood, as indicated by the experiments made by Anderson and Goldberger, is a matter of very great interest, but it is quite possible that the short duration of this period explains the negative results which have been obtained by other observers.

The nature of the virus of the measles, which has remained more or less in the dark, has also been studied by the same physicians, and from the results of their experiments they have determined that the virus of measles is capable of passing through a Berkefeld filter. They used, in their experiments, blood serum from defibrinated blood diluted with three volumes of saline solution. They made two experiments in regard to the drying of the virus, the method used was to place the defibrinated monkey blood into a Petri dish, and this, with its cover tilted, was placed over concentrated sulphuric acid in a desiccator. The air was quickly exhausted from this, and it was then placed in a cold room at a temperature of 15° C. At the end of twenty-four hours the blood was found as a dry scale. This was rubbed in salt solution and then used for inoculation. Some of their inoculations were positive, and they conclude that the virus in the circulating blood of measles may resist desiccation for twenty-four hours, under the conditions of the experiment as described above. Heating rapidly destroys the virus, and it is probably destroyed in fifteen minutes at a temperature of 55° C. Freezing the virus for twenty-five hours does not destroy its virulence, but the incubation period is lengthened, which might indicate some reduction in the intensity of the virus. The keeping qualities of the

virus in measles blood was also tested in a couple of experiments, and it seems probable that the virus may retain some of its infectivity after twenty-four hours at 15° C., although it is certainly very much weakened. The blood was kept in sterile test-tubes plugged with cotton.

MEASLES VIRUS IN THE SECRETIONS OF THE MOUTH AND NOSE. Experiments were also made to demonstrate the presence of the measles virus in the secretions of the nose and mouth, and they found that the mixed secretions were certainly infective at the time of the first appearance of the eruption, and again forty-eight hours later, that is to say, early in the fourth and early in the sixth day of the disease. The disease so produced in monkeys could be transmitted to other monkeys, showing that the infectivity was due to a living virus. It would seem that the virulence of the mixed mouth and nose secretion does not run parallel with that of the blood. As early as 1852 Mayr made a series of experiments upon the human being which made it practically certain that the mouth and nose secretions were infective. These experiments of Anderson and Goldberger, however, are the first obtained under conditions where other sources of infection could be definitely excluded.

In a subsequent publication, Anderson and Goldberger¹ report further experiments in connection with the secretions and scales from cases of measles, and have determined that the nasal-mouth secretions in uncomplicated cases may be at times, but are not always, infective for monkeys. They were not able to draw any definite conclusions of the duration of the infectivity of the secretions, but they think that there is a reduction, if not a total loss, of infectivity with the approach of convalescence. In three experiments, using the scales by scraping the face, forehead, temples, neck, arms, and back, the results were negative, and it is highly probable, if not altogether certain, that the desquamating epithelium of measles itself does not carry the virus of the disease.

Meningitis. **ACUTE MENINGITIS.** Holt² made a study of 300 cases of acute meningitis in infants and young children. He believes that lumbar puncture should be done in all cases of meningitis, and in every suspected case. He found that, apart from epidemics of cerebrospinal meningitis, nearly three-quarters of the cases of acute meningitis in young children are due to the tubercle bacillus, and that in these cases the bacillus is always present in the cerebrospinal fluid, although it may be difficult to demonstrate it in the early stages of the disease.³ In the later stages, careful examination will almost invariably result in positive findings. The von Pirquet test in most cases gives positive results. The tuberculous meningitis may appear as an early manifestation of a general

¹ Journal of the American Medical Association, November 11, 1911, p. 1612.

² American Journal of Diseases of Children, January, 1911, p. 26.

³ Hemenway, American Journal of the Diseases of Children, January, 1911, p. 37.

tuberculosis, and death generally results before the other lesions have developed sufficiently to give any definite signs or symptoms. In almost all the cases, pulmonary lesions may be found at autopsy, if looked for. Another point, which he brings out which is of great importance, is that tuberculous meningitis is of human origin, and the most frequent cause is the exposure to adults with pulmonary tuberculosis. In my experience with tuberculous meningitis I have never seen a case in which the relationship with some other case of human tuberculosis could not be easily established, although, of course, such cases occur. Pneumococcus meningitis he found to occur in association with pneumonia in most instances; it resembles meningococcus meningitis rather closely, but usually runs a shorter course, and is almost invariably fatal. The same is true of the influenzal form. In infants and young children the streptococcus and staphylococcus are rare forms, and usually only occur in the newly born and generally with spinal bifida, in which condition they are rapidly fatal.

CEREBROSPINAL MENINGITIS. Dunn¹ has contributed two articles on this subject, one being the pamphlet of the American Medical Association dealing with animal experimentation in relation to cerebrospinal meningitis, and the other on the etiology, diagnosis, prognosis, and treatment. These articles contain several points of considerable practical interest. The commonest causes of cerebrospinal meningitis are the tubercle bacillus and the *Diplococcus intracellularis* (usually referred to as the meningococcus), and the large majority of all cases are caused by these two organisms. Next in frequency are those cases caused by the pneumococcus, and of considerably less frequency those caused by the streptococcus, by the bacillus of influenza, and by the staphylococcus. One thing which must constantly be borne in mind is that the type of meningitis cannot be told by the clinical symptoms; it was formerly taught, and I think many diagnosticians still believe, that they can tell from the history and from the signs and symptoms present whether the disease is tuberculous or due to one of the other causes. This is unquestionably an error, and the only possible way of any practical value at the present time is to do a lumbar puncture and to examine the cerebrospinal fluid for the form of bacteria present. The diagnostic characteristics of the cerebrospinal fluid in the active stages of the various forms of cerebrospinal meningitis are shown in the following table:

¹ American Journal of the Diseases of Children, February, 1911, p. 35.

	Appearance.	Cell count.	Predominant cell.	Microorganism.
Normal fluid	Clear.	Normal	Mononuclear lymphocyte	None found.
Tuberculous meningitis .	Clear or slightly cloudy.	Increased	Mononuclear lymphocyte	Tubercle bacillus in some (acid-fast).
Epidemic meningitis . .	Cloudy.	Increased	Polymorpho-nuclear neutrophile	Diplococcus intracellularis (Gram-negative).
Pneumococcus meningitis .	Cloudy.	Increased	Polymorpho-nuclear neutrophile	Pneumococcus (Gram-positive).
Streptococcus meningitis .	Cloudy.	Increased	Polymorpho-nuclear neutrophile	Streptococcus (Gram-positive).
Influenza meningitis . .	Cloudy.	Increased	Polymorpho-nuclear neutrophile	Influenza bacillus (Gram-negative).
Staphylococcus meningitis .	Cloudy.	Increased	Polymorpho-nuclear neutrophile	Staphylococcus (Gram-positive).

Another point which it would hardly seem necessary to mention is that the only form of meningitis in which the antimeningococcus serum is of any value is that due to the diplococcus intracellularis, or meningococcus. When lumbar puncture is performed in a suspicious case, one should be prepared to inject the serum, and, if the fluid withdrawn is cloudy, the first dose may be given without awaiting the results of the bacteriological examination. In this way much valuable time is saved. Should the examination show the disease to be due to any other organism than the meningococcus, the serum should not be repeated. With each puncture as much fluid should be withdrawn as possible, and then full doses of the serum should be injected; 30 c.c. should be given in each instance, the only counter-indication being a distinctly abnormal sense of resistance in the spinal canal. If more than 30 c.c. of fluid can be withdrawn, 45 c.c. of serum may be used; in fulminating or very severe cases even larger doses are advisable. In severe or fulminating cases, the serum may be repeated at the end of the first twelve hours unless there has been an improvement in the general condition, and it may be repeated even earlier if the general condition grows worse. In cases of average severity, daily injections of full doses should be used for four days. If the meningococcus has disappeared and improvement has taken place, a lapse may then be made; but if the meningococci are still present, injections should be repeated daily until they have disappeared. If the subjective symptoms, including fever and mental impairment, persist after the diplococci have disappeared, Dunn advises a wait of four days, and then a

repetition of four injections; but, if the patient grows worse, the injections may be given without waiting. If relapse takes place, the four doses, at twenty-four-hour intervals, should be repeated, and then the subsequent management of the case should be just as in the original attack. In the chronic cases in which the diplococci are still present in the cerebrospinal fluid, the serum may be of some use and should be given, but, when hydrocephalus has developed, injections of the serum into the spinal canal is of no benefit, although it is quite possible that injections directly into the ventricles might be of some use. In the other forms of meningitis, Dunn advises early and repeated lumbar punctures for the tuberculous and influenzal forms. In the latter, I would suggest that Flexner and Wollstein's serum be used, if it is available. In those cases due to the staphylococcus, vaccines would seem to be the proper treatment, and Dunn advises the use of antipneumococcus serum in the cases due to the pneumococcus, and the antistreptococcus serum in the cases due to the streptococcus, although up to the present time, as far as I know, no one has succeeded in getting very satisfactory results in meningitis due to these two organisms. The pneumococcus cases may recover spontaneously, but both are usually fatal. As to the value of the antimeningococcus serum, the following tables¹ are of considerable interest.

REPORTED SERIES OF PATIENTS TREATED WITH THE ANTIMENINGITIS SERUM AND THE MORTALITY AMONG NON-SERUM-TREATED PATIENTS.

By whom reported.	Number of serum-treated patients.	Per cent. mortality.	Per cent. of mortality of patients non- serum treated.
<i>America</i>			
Dunn	40	22.5	70.0
Chase and Hunt	12	25.0	90.0
Sladen	23	13.0	64.0
Fulton	22	31.0	78.4
Koplik	15	13.3	60.0
Ladd	31	35.5	?
Morgan and Wilkinson	10	30.0	?
<i>Great Britain</i>			
Robb	90	30.0	75.0
Ker	30	43.0	80.0
<i>Germany</i>			
Krohne	59	40.6	66.0
Schoene	30	27.0	53.0
Levy	23	21.7	78.0
Többen	29	34.0	56.0
<i>France</i>			
Netter	50	18.0	83.0

¹ Dunn, Animal Experimentation in Relation to Epidemic Cerebrospinal Meningitis. Defense of Research Pamphlet No. XXI, American Medical Association, 1911.

MORTALITY IN EPIDEMIC MENINGITIS UNDER SERUM TREATMENT; CASES ANALYZED
ACCORDING TO PERIOD OF INJECTION.

Period of injection.	Flexner. Per cent.	Netter. Per cent.	Dopter Per cent.
First to third day	14.9	7.14	8.20
Fourth to seventh day	22.0	11.1	14.4
Later than seventh day	36.4	23.5	24.1

GROSS PERCENTAGE MORTALITY IN EPIDEMIC MENINGITIS UNDER SERUM TREATMENT, CASES ANALYZED ACCORDING TO AGE OF PATIENTS

Age groups.	Reported by		
	Flexner. Per cent.	Netter. Per cent.	Dopter. Per cent.
Under one year	50.0	50.0	48.6
One to two years	42.1	0.0	20.1
Two to five years	23.5	16.6	9.3
Five to ten years	11.4	12.5	8.5
Ten to twenty years	23.8	0.0	10.2
Above twenty years	26.4	0.0	14.1

INFLUENZAL MENINGITIS. In PROGRESSIVE MEDICINE for 1910, I noted the work of Cohoe, who, the previous year, collected reports of 24 cases in which the diagnosis was based on bacteriological findings. Fifty-six per cent. of these cases occurred in children under one year of age; 85 per cent. of the patients died, and most of them came to autopsy. Since that time there have been a number of cases reported, which I noted last year, and another report of considerable interest is that of Rhea.¹ This observer made a study of the central nervous system of several children, employing media on which the bacillus influenzae grows best. In 2 cases the influenza bacillus was isolated alone, and in 2 other cases associated with other organisms. The meningitis produced by this bacillus is liable to be characterized by extensive intrapial hemorrhages, and there may be also an acute inflammatory reaction of the bloodvessels in the brain substance. These inflammatory changes may be related to some of the permanent lesions of the central nervous system, and in some instances the organism circulates freely in the blood. The exudate becomes organized, and may interfere with the normal circulation of the cerebrospinal fluid, and lead to internal hydrocephalus. In the chronic cases which follow acute influenzal meningitis, there may be an increase of connective tissue in the arteries of the meninges. Probably if more attention were paid to the isolation of the influenza bacillus more cases of meningitis might be found in which it is the cause or an associated organism, but up to the present time these cases may be regarded almost as medical curiosities.

¹ Archives of Internal Medicine, August, 1911, p. 133.

For example, Davis¹ reported 7 cases, in 5 of which he was able to obtain autopsies, and Holt,² in 197 cases of acute meningitis in infants and young children, found 4 cases due to the influenza bacillus.

Wollstein³ has made a careful study of 8 cases, in all of which the cerebrospinal fluid was cloudy, and deposited a whitish or yellowish sediment upon standing, the supernatant liquid remaining somewhat turbid. The number of influenza bacilli present was usually very large. It is interesting to compare her statements with those made by Cohoe, the latter observer claiming that the spinal fluid obtained by lumbar puncture in influenzal meningitis may be quite normal in appearance, so that the influenza bacillus may be overlooked unless the films are very carefully searched. All other observers, so far as I know, agree with Wollstein. Wollstein was able to produce meningitis by injecting suspensions of influenza bacilli into the subdural space by means of lumbar puncture; meningitis was not invariably obtained, and the results seemed to vary with the virulence of the culture employed. In the Rhesus monkey the meningitis so set up has a tendency to run a rapidly fatal course, and resembles that of human beings. Influenzal meningitis apparently bears a rather close relation to ordinary clinical influenza, and not only Wollstein but other observers have noted that the secretion from the nasopharynx and the bronchi contain influenza bacilli on the first day of the meningitis, and in cases where cultures have not been made there is frequently the history of a "cold."

In other instances, the disease has evidently developed from an otitis caused by influenza bacillus, and Hecht believed that the primary lesion in the lung was the cause of the case which he reported.

Among the suggestions for treatment is that of Brem and Zeiler.⁴ They advise giving hexamethylenamine, which by itself does not yield especially good results, but in combination with permanent drainage by means of lumbar puncture they believe will give better results than are obtained by other methods.

Wollstein⁵ has been able to produce an immune serum by injecting virulent cultures of the influenza bacillus into the goat, and this serum, when injected into the subdural space, is capable of arresting the progress of experimental influenzal meningitis, and in bringing about the recovery in monkeys thus affected. The results of the serum injections are that the phagocytes attack the influenza bacilli with more vigor, so that the number of germs is reduced and their capacity for growth is diminished. There is a cessation of the local inflammatory process, and rapid betterment in the general condition, which is usually followed by restoration to health. In order that this serum be of any service in

¹ American Journal of Diseases of Children, April, 1911, p. 249.

² Ibid., January, 1911, p. 26.

³ Ibid., p. 42.

⁴ Ibid., June, 1911, p. 417.

⁵ Journal of Experimental Medicine, 1911, vol. xiv, No. 1, p. 73.

cases of meningitis in man, it will be necessary to have the bacteriological diagnosis made very promptly, and this can, as a rule, be done by immediate microscopic examination of the cerebrospinal fluid, although the results so obtained should be confirmed by cultural tests. The practical problem of having a supply of such a serum available presents many difficulties, except, perhaps, in the largest medical centres.

MENINGITIS DUE TO A PARAMENINGOCOCCUS. Dopter,¹ on examining the cerebrospinal fluid in patients suffering with meningitis from different points of France, found the germ resembling the meningococcus, which he has called the parameningococcus. Clinically, the cases infected with this organism cannot be differentiated from the cases of cerebrospinal fever in so far that they all terminate fatally. Bacteriologically, the parameningococcus resembles the meningococcus, and it gives the same fermentation of sugars, but it does not agglutinate with the antimeningococcus serum. He also prepared an antiparameningococcus serum which, from an experimental standpoint, has the same value as the antimeningococcic serum, and he recommends its use in practice in cases in which the antimeningococcic serum is not effective.

PNEUMOCOCCUS MENINGITIS. Schlesinger² has reported 3 cases of meningitis due to the pneumococcus, and has added some observations on this disease. The onset may be sudden, even apoplectiform, and in other cases the disease may begin more slowly, and sometimes the onset is insidious. The fever does not last as long, and is less severe than in cerebrospinal fever. The principal point of interest that he brings out is that there may be either a serous or a purulent exudate, and that the prognosis in the purulent form is not necessarily hopeless. He recommends spinal puncture and the use of a pneumococcus serum.

MENINGOCOCCUS SEPTICEMIA. Skilton³ has reported an interesting case of meningococcus septicemia, in which the organism was found in blood smears. Similar findings were reported by Simon, in 1907, and I believe that this observation has been made a number of times. So far as I know this method of making the diagnosis in meningococcus septicemia has not been noted in the literature.

Involvement of the Pancreas in Mumps. Neurath⁴ has reported 2 instances in one family of this interesting symptom-complex, and has reviewed the literature on this subject, and added a short bibliography, beginning with the contributions of Auché in 1905. He has also added a few of the earlier references to this subject, the first reference being that of Schmachpfeffer in 1817.

¹ La Semaine Médicale, May, 17, 1911.

² Wiener medicinische Wochenschrift, January 1, 1911, p. 40.

³ Journal of the American Medical Association, May 20, 1911, p. 1446.

⁴ Wiener medicinische Wochenschrift, May 6, 1911, p. 1217.

The involvement of the pancreas in mumps has not attracted much attention until recent years. Simon (1903) has reported 10 instances occurring in 652 cases. The symptoms came on between the first and twelfth day, usually between the third and sixth day, and lasted from two to seven days. There was pain between the xiphoid cartilage and umbilicus, sometimes radiating along the costal arches, and even into the interscapular, dorsal, and lumbar regions. Palpation may be impossible on account of pain. There was nausea, vomiting, and diarrhea in one-half the cases. He states that the fever was irregular, and was absent in 4.

Cuche (1897) found tenderness over the pancreas in 20 out of 26 cases. More recently Sharp (1909) reported 5 instances occurring in 33 cases of mumps. The points of particular clinical interest are first, the sudden onset of the abdominal symptoms very often just about the time that the mumps is beginning to get better, and the fact that the pain is particularly in the locality of the pancreas. There is usually marked tenderness upon palpation, sometimes so much as to interfere with the examination. Nausea and vomiting were perhaps more common than was formerly supposed. In addition to this there is slowing of the pulse, and this is so constant that some authors lay considerable stress upon it as a diagnostic feature. Cammidge made an examination of the urine in one of the cases reported by Edgcombe, and found that it gave his reaction showing involvement of the pancreas, and Sharp has called attention to the fact that the urine in some of his cases has contained a substance which reduces Fehling's solution. In 4 cases, Edgcombe found the presence of acetone and diacetic acid. Sharp also made some observations upon the stools, and in one case blood was found, and in others disturbances of the fat digestion. It is also of interest to note that cases have been reported in which the involvement of the pancreas was the beginning of an attack of mumps, and in a few instances was apparently the only manifestation of the mumps infection. There does not seem to be, from the study of the cases, any very close connection between the involvement of the pancreas by mumps and the later development of diabetes mellitus, although this opinion has been put forth by various authors from time to time.

Oriental Sore. Darling¹ has described a case of Oriental sore in Panama, in a negro, aged forty-four years, who had never been in any of the regions in which Oriental sore is endemic, and it may be added that there had been no natives or visitors from the Levant, India, or other regions of the old world where this disease is found. The sore in this instance followed the bite of a fly which was undoubtedly a tabanid. Smears from the granulating surface contained free and intracellular microorganisms resembling *Leishmania tropica*. Oriental sore is a

¹ Archives of Internal Medicine, May, 1911, p. 581.

disease which it is strange has not been met with more frequently in America. It is caused by a protozoön, the *Leishmania tropica*, and in various parts of the world bears different names: The Lahore, Multan, and Delhi sore; Oriental sore; the Delhi, Aleppo, Biskra, and Gafsa boil; as well as numerous other appellations. The disease is endemic in certain parts of the Orient, chief among which may be mentioned Delhi, Lahore, Punjab, Persia, Arabia, Trans-Caucasia, Turkey, Morocco, Algeria, and Egypt. But few instances have been reported from America, although it has been noted in Brazil, and Wright has reported a case from Boston, which had been imported from Armenia. Wright's work on this case resulted in establishing the etiological connection between the *Leishmania tropica* and Oriental sore. In certain places in Bagdad and Delhi and other localities the slightest wound tends to become infected and to be transformed into a sore. Even visitors after a few days in these regions are said to be almost certain to contract it. It has also been noted that the disease is most prevalent at the beginning of a cool rainy season, and in the more temperate climates, at the end of the summer, which probably corresponds to the fly season. The lesion is nearly always on the exposed parts of the face, arms, or legs, which is very suggestive that the virus is transmitted by a fly rather than by a bed-bug or flea. The protozoön is found in stained sections of tissue invading the large mononuclear endothelial cells, and occasionally in the large mononuclear lymphocytes and in the polymorphonuclear leukocytes. The organism is round or oval, with a large purple-staining mass at the periphery, and a smaller, very deeply staining dot or rod a short distance from the large mass just alluded to. The organisms are commonly 2 to 4 μ in diameter. In smears many are found free. The disease has been attributed to the bites of flies and also to the bites of mosquitoes. It has never been definitely determined just how the disease is transmitted. Dogs and camels also are affected with similar sores, and those on the dog, according to Sambon, contain the characteristic parasites. The period of incubation probably varies from a few days to several months, and Manson has reported an unquestionable Oriental sore which did not appear until five months after the patient has been exposed to any possibility of infection.

The sore first appears as one or two small papules like those that ordinarily follow insect bites, and these are accompanied by considerable itching. This increases in size and becomes hard. The margins become reddened, and, when the papule is 10 to 15 mm. in diameter, it becomes dry and gray. Later, ulceration and necrosis occur. There is some fluid as an exudate which dries into a firm adherent crust. The margin of the ulcer is formed by normal skin somewhat infiltrated and heaped up. The lymph nodes draining the part may become tender, although they are said not to enlarge. The ulcer gradually becomes

smaller, the crust separates from time to time, and healing finally takes place, often leaving a depressed scar. The sore may heal from four to twelve or more months. The appearance of the sore is rather characteristic, and diagnosis can be made on sight by one familiar with its appearance. The presence of *Leishmania tropica* is necessary to establish an absolute diagnosis, and to demonstrate this may require long and careful search. The *treatment* is not very satisfactory, and consists chiefly of surgical cleanliness and the protection of the part with antiseptic dressings. Various applications have been suggested, and in Darling's case the involved tissue was excised. In every instance the sore should be carefully protected from flies and mosquitoes, to prevent the spread of the disease. There are a number of trypanosomes which cause the disease in man. One causing kala-azar was described by Leishman in 1903, although he had previously observed these bodies in 1900. In the same year Wright described similar bodies in Oriental sore, and in 1909 Nicolle described the trypanosome in the infantile kala-azar in Tunis, and this he named *Leishmania infantum*. Rogers was able to grow the organisms in an acid sodium citrate medium, with a temperature from 20° to 22° C. Nicolle also described the same parasite in the dogs of Tunis. The life history of the trypanosome and changes which it undergoes will not be gone into at this time, but it may be mentioned that a flagellate form may be found in numerous hosts.

Pappataci Fever. This disease is noted in the latter part of this article, under the heading "The Nature of the Virus of Yellow Fever, Dengue, and Pappataci Fever," and the reader is referred to that section. It is interesting to note, in addition, that the fever has been found in Messina and on the coast of Calabria.¹ It has also been noted in certain parts of South America.²

Bacillus Paratyphoid B. EXPERIMENTAL INFECTION OF THE GOAT WITH THE BACILLUS OF PARATYPHOID B. Scordo³ points out the results of the experiments with the paratyphoid B., which are very similar to the results which he obtained from the experiments carried out with the typhoid bacillus. He determined that the goat could easily be infected by intravenous injections, and by way of the mouth; that these infected animals remained carriers of the bacilli for months after the disease had apparently ceased; that the bacilli were eliminated in the feces and urine, and also in very large quantities in the milk. He also demonstrated that these bacilli, which were so eliminated, were virulent. These researches of Scordo are of very great importance in calling attention to the goat as a carrier of disease, a point which had been overlooked until investigations were made in regard to Malta fever,

¹ Gabbi, *Pathologica*, September 15, 1910, p. 546.

² Tiraboschi, *Archive de Parasitologie*, October 30, 1910, p. 330.

³ Il Policlinico, Sezione Medica, April, 1911, p. 161.

which are outlined above. In all cases of epidemics of typhoid or paratyphoid B., in which the source of the diseases cannot be determined, or in which goats can in any way play a part, the animals should be at once suspected, and investigations made as to whether or not they are carriers of these diseases.

AN OUTBREAK OF ACUTE GASTRO-ENTERITIS CAUSED BY *BACILLUS PARATYPHOID B.* Schotmüller, in 1904, pointed out that the paratyphoid B. is capable of giving rise not only to paratyphoid fever, but also to acute gastro-enteritis simulating food poisoning. An instance of an outbreak of this kind is reported by Bainbridge and Dudfield.¹ The symptoms in the cases were almost all the same, although there were some variations in severity. There was severe abdominal pain, followed by vomiting and persistent and violent diarrhea, which could not be controlled by the usual remedies. Fever was present, the temperature in some cases being as high as 103° F., and lasted for various periods, up to a week. In some of the older patients there were attacks of grave syncope. Convalescence was slow, but all the patients recovered. The point of interest is, that the paratyphoid B. was isolated in some of the cases, and agglutination tests also carried out, and, while the attacks were attributed to food, no one article of food was eaten by all of the cases, nor were all of the cases in the same house. It is possible that the outbreak was started by a paratyphoid carrier.

Another severe outbreak of infection caused by a paratyphoid carrier was reported by Troomsdorff, Rajchman, and Porter.² More than 100 patients were affected, and 5 of the sufferers died, the symptoms being those of very severe meat poisoning, nausea, vomiting, severe abdominal pain, diarrhea, and great weakness. It was found that all the persons affected had eaten pork pies originating from the same baker.

Without going into the experiments made, it would prove conclusively that the attacks were due to the paratyphoid B., the organism being derived from the head cook, who was said not to have eaten any of the pies, and who had not been ill in the least degree, but whose blood gave a strong positive reaction, and eight weeks after the epidemic she was found excreting large quantities of bacteria.

Another interesting study of the subject of the paratyphoid group of bacilli has been made by Bainbridge and O'Brien.³ They take up the question of the paratyphoid B. and the *B. suipestifer*. The *B. enteritidis* of Gärtner, now called the *Bacillus paratyphoid A.*, was not included in their observations. They regard the *B. suipestifer* and the paratyphoid B. as separate organisms. In their experience, the former has been found only in food or in outbreaks of acute illness attributed to food poisoning, whereas the paratyphoid B. has been

¹ Journal of Hygiene, March, 1911, p. 24.

² Ibid., p. 89.

³ Ibid., p. 68.

found in cases of paratyphoid fever or in persistent paratyphoid carriers. They put forth the suggestion that the two organisms may have a different distribution in nature, the normal habitat of the *B. suipestifer* being the alimentary canal of a pig, and also other animals, and of food derived from such animals, whereas the habitat of the paratyphoid *B.* is the human alimentary tract, including the gall-bladder. Apart from carrier cases, the paratyphoid *B.* is not found in healthy human beings.

Von Gonzenbach and Klinger¹ have described an interesting epidemic due to Gärtner's bacillus. The epidemic occurred in a small town in Switzerland in the canton of Zürich. There were 49 cases altogether, 11 following the use of salt pork and 38 following the use of beef. All of the meat had been obtained from the same butcher. The symptoms in the cases were very much alike. Most of the individuals were taken within twenty-four hours, and only in the very hard cases was the incubation period as long as two days. The symptoms resembled those of gastro-enteritis. There were nausea, vomiting, chills, pain in the abdomen, headache, and numerous foul-smelling stools. The latter cases were bed-ridden for from four to six days, and the more severe cases some time longer. One patient died.

Investigation of the meat in the stools of the patients showed the presence of Gärtner's bacillus, and it is interesting to note that it was found in the salted meat, also in the smoked meat, as well as in the raw meat, and the ordinary cooking did not prevent the infection, although it is quite probable that the cooking was quickly done.

EMPHYEMA DUE TO THE BACILLUS PARATYPHOID B. Corta and Clavelin² reported an interesting instance of an empyema coming on in the course of a case of paratyphoid fever. The patient had become convalescent when the fever again returned, together with pain in the left chest and all the signs of an infusion. The puncture showed a red-dish colored pus, which contained the *Bacillus paratyphoid B.*

MENINGEAL SYMPTOMS IN PARATYPHOID B. Sacquépée³ has described two epidemics in which in from 14 to 25 per cent. the onset was with symptoms pointing clearly to the involvement of the meninges. There were violent headache, pain in the back, stiffness of the neck, Kernig's sign, etc. At the end of several days these meningeal symptoms lessened, and the clinical picture was that of typhoid, the diagnosis being made by blood cultures. In all the cases the cerebrospinal fluid was clear and free from organisms, so that the symptoms were evidently caused by intoxication, and not by a meningitis.

Pellagra. Since Sambon's studies on this subject have been published, considerable amount of attention has been paid to his theory

¹ Archiv für Hygiene, 1911, vol. lxxiii, Heft 3 and 4, p. 380.

² La Semaine Médicale, May 31, 1911, p. 262.

³ Ibid., December 28, 1910, p. 612.

that the disease is due to a parasite, and this parasite is transmitted by means of the bite of a fly of the *Simulium* species. Sambon's theory is worthy of most careful study, as he is an observer of recognized ability, and in 1903 was one of those suggesting the tsetse fly theory of sleeping sickness, which has been proved to be correct.

Pellagra has been found to be so common in America that doubtless ample opportunity will be afforded to prove or disprove this theory concerning it.

Roberts¹ has contributed an interesting article on the subject of the appearance of the disease in Georgia, and believes that Sambon's idea is correct. The parasite of the disease has not yet been discovered. The *simulium* fly is of the order Diptera, or the two-winged flies. There are three species found in Italy—the *S. reptans*, *S. ornatum*, and *S. pubescens*, the last being the most important. There are several species in America, chief of which are the *S. venustum*, or black fly found in the northern woods and celebrated for its biting, and the *S. pecuarium*, or the southern buffalo gnat. Roberts found in Georgia another species, the *S. pictives*, which has been reported from various parts of the United States. The buffalo gnat is responsible for the deaths of a great many domestic animals, and is found chiefly along the tributaries of the Mississippi River. It was first noted in Mississippi in 1818. They are not present every year in large numbers, but are apt to be most numerous in times of floods. It has been noted in Italy that the greatest number of pellagra cases occur in the season in which there are floods and the streams overflow. The insects appear in two groups each year, one coming from February to April and the second from September to December, and it has been noted that pellagra is most active in the spring and fall.

The eggs of the fly are laid usually in rapid shallow streams. They hatch in about eight days to a larva and pass in about four into the pupa stage, emerging in three weeks as the mature gnat. Sambon, in his study of the disease in Italy, found that it was not due to eating maize, as had been hitherto believed, and based his belief on the fact that maize was grown in Italy for nearly two centuries before pellagra appeared, that the disease occurs in people who do not eat maize or corn products, and that instances are on record where children contract the disease as early as the third month, in spite of the fact that they have never eaten corn products of any kind, and lastly, the failure of preventive measures based on the corn theory. The distribution of the disease follows the districts in which the streams are infested by the *simulium* fly, and these foci have remained exactly the same for at least the past century. Pellagra is a disease of the country and occurs along streams and running water. Roberts made a study of 36 cases,

¹ Journal of the American Medical Association, June 10, 1911, p. 1713

26 in women and 10 in men. All of these with but one exception lived either on or near streams of water.

It is interesting to note in connection with the above observations on Sambon's theory, that while pellagra has been known and studied for many years, we really possess comparatively little exact information concerning its features as an epidemic disease. Sambon has been interested in proving his theory, and has contributed some important contributions, and the only other modern work along this line is that of Alessandrini.

It is also interesting to note the review of Lavinder.¹ In the first place, we have only vague ideas of the prevalence and geographical distribution of the disease. It would seem to be a disease of the tropics and of the warmer parts of the temperate zone. Its existence in America undiscovered, may be repeated in other places, and it is quite possible that the disease is overlooked or confused with other diseases in other parts of the world. The places where it must be studied, however, are those countries where it is well known, that is, northern and central Italy, southern Roumania, the Austrian Tyrol, southeast Hungary, and southeast United States. It has been reported, however, from many other places. It is a disease which is endemic in certain parts of the countries mentioned, and it occurs in patches, as it were. It seems to travel about slowly, in Roumania, for example, having been long endemic in the south, now appears to be moving gradually northward. It has never spread to Switzerland and Germany, although it is present in neighboring countries. It apparently has disappeared from France, where it once was common.

Sambon, as noted above, believes that the disease is to be found in the territory in which there are swiftly running streams. In Europe, the disease is one of the poor peasants. The city dwellers, rich and poor alike, usually escape, and the better part of the rural population, while not entirely free, generally do not suffer from the disease. In the United States it would seem that the disease is most prevalent in the small mill towns of the southern states, but the disease has certainly not been limited to the poorest classes.

The disease is supposed to have some relation to water, and in addition to Sambon's hypothesis we have that of Alessandrini, who believes that the disease is due to a water-born nematode worm of the family Filaridæ. Siler and Nichols and others have pointed out the presence of amebæ in people affected with pellagra, and from this they also have suggested the possibility of the relation of the disease to the water supply.

Pellagra is chiefly a disease of adult life, occurring between the ages of twenty and forty years, and, while children may be affected, they do

¹ Public Health Reports, September 29, 1911, p. 1459.

not suffer as severely as older individuals. The sexes are affected nearly alike, but there are more women affected than men, and chiefly during the child-bearing period, which is probably due to the increased strain imposed by that function. The disease attacks the races and nationalities without any apparent regard. It is very rarely claimed that the disease is hereditary, but it would seem that the child of pellagrous stock may show a predisposition to it. This, however, is open to question. The disease is apparently not contagious in the ordinary sense of the word. Lavinder cites the example of the pellagrosario near Venice, where for years many pellagrins have been treated. No attendant or nurse has ever been known to develop the disease. Observations of this kind could be multiplied almost indefinitely, and it is also well known that it frequently happens that only one member of the family may have the disease, the rest remaining in good health. Several observers in the United States have suggested the possibility of direct transmission of the disease. One attack of pellagra does not cause immunity, but rather predisposes to subsequent attacks or recurrences. One point of interest is the fact that pellagra, as is well known, is most marked in the spring and fall.

The various experiments made upon animals have so far been without results, and it is extremely questionable whether either the domestic or laboratory animals are subject to the disease.

The theory that the disease is caused by eating spoiled maize, which was so generally accepted for many years, is perhaps one of the reasons why the disease is not more accurately studied, for cases occur in which there can be no doubt that corn had no influence whatever. The large number of cases which have been reported suggest that this is one of the diseases which should be carefully restudied, and, in order to determine its prevalence, it should be made reportable by law.

AN ATTEMPT TO INFECT A RHESUS MONKEY WITH PELLAGRA. Anderson¹ secured the blood from 2 cases of pellagra, and the spinal fluid from 1, and injected it into several monkeys. The monkeys were kept in a well-lighted room, and were exposed to sunlight on bright days. The monkeys were kept under observation from July, 1910, until about March, 1911. Nothing of any moment occurred, although in 1 monkey there was slight bronzing of the face, and a pinkish tinge to the skin of the neck and upper part of the chest. This was more distinct at some times than others, and existed a long time without any apparent increase. The results may be regarded as entirely negative.

It may be possible that the Rhesus monkey is not susceptible to pellagra, or, if susceptible, it is possible that the technique used was in some respect faulty, or that the infective agent was not present in the blood, nor in the spinal fluid at the time when the experiment was made.

¹ Public Health Reports, June 30, 1911, p. 1003.

Lavinder¹ experimented with 9 Rhesus monkeys, inoculating them with certain body fluids and tissues taken from pellagrins of different types. Some of the inoculations were made intraperitoneally and others intracerebrally. After six months' time all the monkeys remained perfectly well and in good condition.

THE PELLAGRA GERM. An interesting preliminary note from the laboratory of the Tulane University has been made by Bass.² For several years he has been collecting cultures of bacteria from sources supposed to be in some way connected with pellagra. Most of these bacteria have been obtained either from cornmeal or bread supposed to have been fed patients with pellagra, or from the stools of pellagra patients. The cultures were isolated by plating the suspected material on a culture medium containing cornmeal, water, and agar. A sterile meal was made from green corn by a special method, and this sterile meal was inoculated with 9 different cultures; this was incubated at 37° C. for three days, and then fed to chickens aged from two and a half to three and a half months. In addition they were given as much unpolished rice as they would eat for thirty-eight days, and after that the diet was changed to a good quality of cracked corn. One chicken developed a condition very closely resembling pellagra in man; it had several attacks of diarrhea, became weak and emaciated, and on the eighty-eighth day it was noticed that the legs below the knees were red and inflamed, and that a bloody fluid was oozing through the little cracks of the scaly skin; the skin turned dark in color, and on the seventh day began to show evidences of shedding. Five days after the lesions were first noticed the fowl was placed in a dark room and only good food given. The shedding of the skin progressed slowly, and two weeks later the fowl was sacrificed for permanent preservation. Experiments are now being made to determine whether this condition can be reproduced by use of the same culture in other fowls.

Some Features of the Squirrel Plague Problem. McCoy³ has considered the question of plague among the ground squirrels along the Pacific coast, which promises to be for some time to come an important factor in the health of the inhabitants of that part of the country.

The first positive knowledge that we had of the plague in the ground squirrels of America, was the finding of one of the infected rodents in August, 1908. Since that time the plague has been found constantly in six counties of California, and in these in almost every locality in which it has been looked for. In some of the other counties the disease has been noted.

Whether the disease in squirrels will spread to other parts of the country or not is a question. The natural barriers being the rivers

¹ Public Health Reports, June 30, 1911, p. 1005.

² Journal of the American Medical Association, November 18, 1911, p. 1684.

³ California State Journal of Medicine, March, 1911, p. 105.

and high mountain ranges, and the fact that the mountain ranges are cut by passes renders it possible, even if it is not probable, that the disease could find an outlet. The danger of transportation of infected squirrels on common carriers, such as ships and trains, is so small that it may be disregarded. The disease in the squirrel is not a very great source of danger to man. While there may be occasional cases traced to this source, there are not many individuals affected. The greatest danger of the situation is in the risk of the infection of rodents of cities, and it is highly probable that city rats could easily be infected from the fleas from infected squirrels.

It is very probable that the epidemic in the squirrels will eventually die out of its own accord, and, while we have no positive knowledge of plague in the squirrels except that which has been accumulated recently, other epidemic diseases of animals have a tendency to die out.

The extermination of the disease among the squirrels is a difficult problem. The individual property owner will be a certain factor in getting rid of them, while municipalities should guard against having the rats infected by having a squirrel-free zone about them. The cost of ridding large tracts of land from ground squirrels is so great that certainly for the present it is not likely that any such effort will be made upon a very large scale.

Poliomyelitis. THE OCCURRENCE OF INFANTILE PARALYSIS IN 1910. Last year I noted the various collective investigations that had been undertaken with reference to the prevalence of infantile paralysis, and one of the most important recent contributions to this subject is the article by Lovett.¹ He gives a brief résumé of the occurrence of the disease in America, which need not be noted further than to reproduce some of the charts (Figs. 1, 2, and 3), that show a few cases have been observed from time to time, but that in 1907 there was a sudden increase in the number of cases, a decrease in 1908, a marked increase in 1909, and a still greater increase in 1910. He also shows the relative prevalence of the disease in Europe and America. It would seem that we are evidently now facing conditions favorable to the spread of the disease, which did not exist in former years, and which apparently do not exist in Europe at the present time. In 1910, there were about 8700 cases reported in the United States.

This is very well shown in the map of the United States which Lovett has prepared, and which I have reproduced through his courtesy. The mortality rate in various states differs very greatly, but this difference is probably more apparent than real. In Massachusetts the mortality is about 8 per cent., which is perhaps slightly lower than the figures from foreign countries where the mortality rate seems to vary between 3 and 15 per cent. In view of the facts which Lovett has brought out,

¹ American Journal of the Diseases of Children, August, 1911, p. 65.

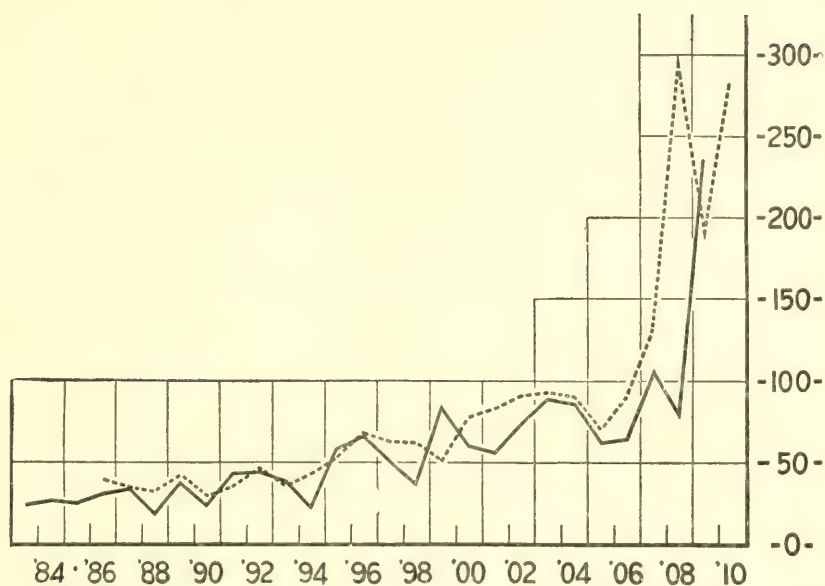


FIG. 1.—Number of new patients with infantile paralysis treated at Children's Hospital, Boston, indicated by the solid black line; those treated at the New York Orthopedic Dispensary and Hospital by the dotted line; both by years.

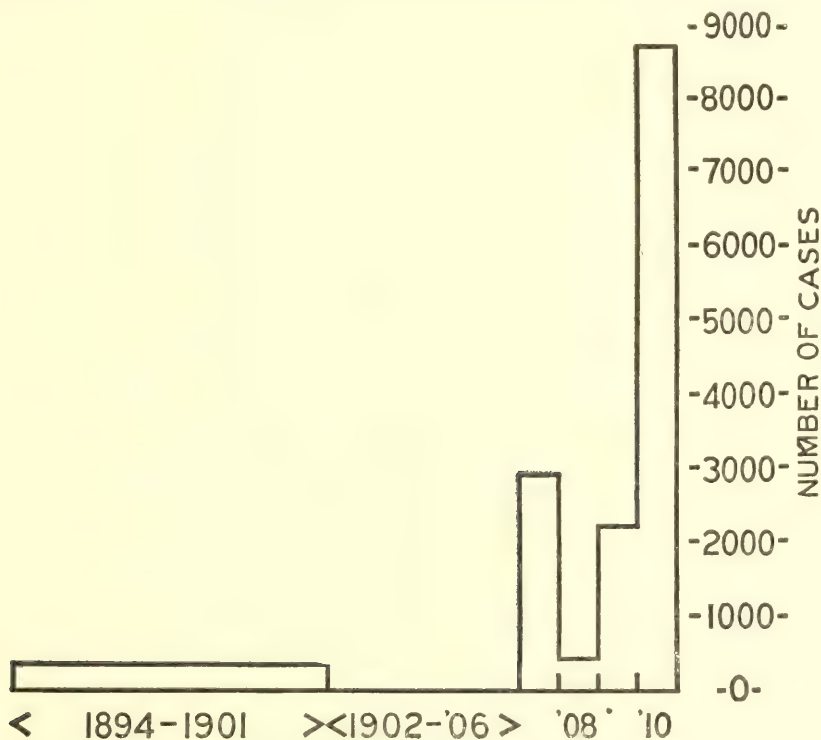


FIG. 2.—Prevalence of infantile paralysis in the United States, 1894 to 1910.

it would seem that all State Boards of Health should be urged to make collective investigations of this disease, and that it should be made reportable by law. Ordinary routine reports will not do much to solve the various problems in connection with this malady, but they give an idea of the number of cases and of the number of deaths. What is particularly needed is a careful and intensive study by competent medical experts who should give up their entire time to the work. This has been undertaken in Massachusetts, and Lovett and Sheppard¹ have followed up their excellent report of 1909 with an admirable résumé

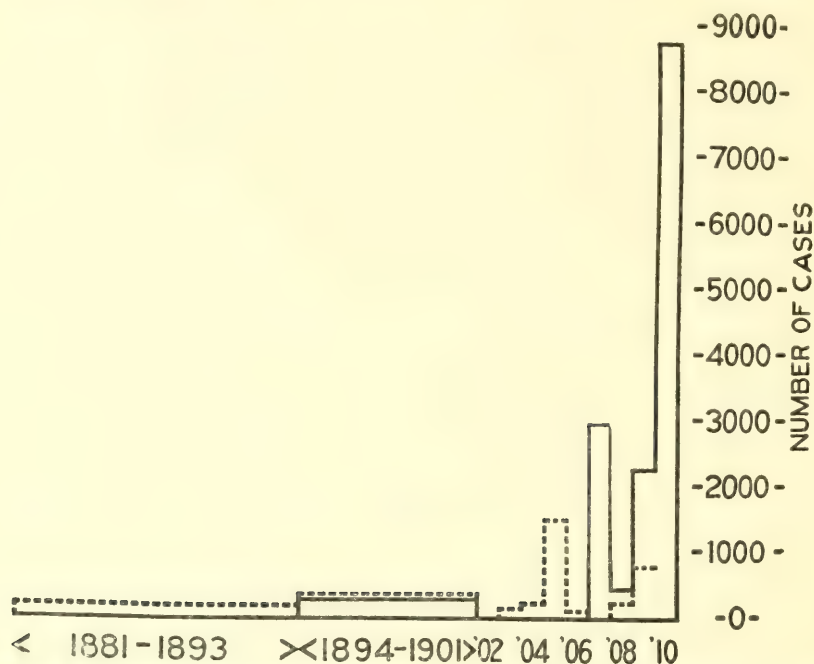


FIG. 3.—Relative prevalence of infantile paralysis in the United States and Europe and Australia; the solid black line refers to the United States; the dotted line to the following countries: Italy, Sweden, Norway, Germany, Austria, France, England, and Australia.

of the facts connected with the disease. This is the fourth collective investigation made in Massachusetts under the direction of Richardson, the legislature of that state having provided \$5000 for this purpose, and during the present year double that amount will be available, so that the next report will probably be more valuable than the preceding ones. There was a total of 845 cases reported, and in 601 of these cases blanks were filled out giving additional information, and a group of 200 cases were studied by a number of medical investigators. There was a

¹ Boston Medical and Surgical Journal, May 25, 1911, p. 737.

marked epidemic centre in Springfield and in Fall River, and a suggestion of a minor epidemic centre in Boston. The disease is usually regarded as one which occurs more frequently in very dry years, and yet in the past four years the driest years have not been attended by the largest number of cases in Massachusetts, although in 1910 the driest month, August, showed the greatest number of cases. The disease was studied with reference to the amount of dust present, the age of the houses, the presence of insects, the illness of animals, and the nativity, as well as various facts in connection with the patient, such as diet, etc. There was a slightly greater number of cases in males than in females, the number being 333 to 270. The tables showing the length of time that the pain and tenderness lasted, the general features of the acute attack, the date and distribution of the early paralysis, have not brought out any facts in addition to those which I noted last year. It was evident that the disease existed in all classes of the community, and that it exists in all conditions of sewage disposal and with all kinds of water supply. There did not seem to be an excessive amount of dust in the affected localities. The proportion of houses in which the disease was noted, and in which there was also sickness, paralysis or death in domestic animals or birds, seemed rather larger than one would naturally expect.

Dixon¹ has reported on 1076 cases occurring in Pennsylvania during 1910. The disease began in February with 3 cases, but it was not until July that the disease was said to be prevalent. August and September showed the greatest number of cases. An intensive study was undertaken by the Department of Health, and 748 cases were studied. The number of houses containing domestic animals which were ill was very small, quite the opposite to what occurred in Massachusetts. In one instance there was a sick dog, in one a sick horse, and in two sick cats. In three homes there were chickens with paralytic disease, and in one home a bird with paralysis. The tables showing the date of onset, the age, and the like, have not added anything of material interest to the facts as we now know them. The majority of cases occurred between the first and second years, and quite a large number of cases between the second and third, and third and fourth years, then a gradual decrease, very few occurring after twenty-five.

The study of the blood from human beings and monkeys showed a bacillus, the characteristics of which are reported in detail, but which is doubtless not the cause of the disease, as it is too large to pass through the Berkefeld filter. It is interesting to note that they were unable to find the virus in a child dead with the disease, the body of which had been embalmed with embalming fluid containing formaldehyde and arsenic.

¹ American Journal of the Diseases of Children, October, 1911, p. 221.

POLIOMYELITIS IN FRANCE. Since attention was called to this disease, almost all the countries have suffered more or less, with the exception of France. In 1910, however, it seemed to have made a considerable inroad, and in the report made by Arnold Netter to the Academy of Medicine, May 23, 1911, the disease had been noted in 33 of the departments of France, and there had been epidemics in the departments of Aube, Yonne, and in Basses-Pyrenees and Landes. The mortality was more than 10 per cent., and in some towns, as at Salies, it reached 15.5 per cent. Netter has suggested that the disease be placed in the list of those which must be reported to the health authorities.

CEREBRAL FORMS OF POLIOMYELITIS AND THEIR DIAGNOSIS FROM MENINGITIS. The cerebral forms of this disease present many features that are puzzling, and that are very frequently mistaken for cases of meningitis. Attention was first called to this particularly by Medin. In these cases the disease attacks the structures of the brain, medulla, and pons, leaving the cord for the most part unaffected. These cases have been previously described by various writers as encephalitis or polioencephalitis or poliomyencephalitis. Perhaps the best grouping for these conditions is to put them all under one head of polioencephalitis.

Koplik¹ has made a study of a number of cases, of which he gives the clinical details at some length. He states that the cases which are limited in their extent to the ocular and facial nuclei and which are accompanied by cerebral symptoms are those which have been of greatest interest because it is in such cases that it is difficult to make the differential diagnosis from cerebrospinal fever and tuberculous meningitis. This differential diagnosis is at all times difficult and it will depend largely upon a thorough study of the clinical findings in any given case. There are two points, however, to which Koplik calls special attention. The first, that in polioencephalitis the child has a high fever, but is liable to be up and about in twenty-four hours, which is not the case in meningitis, when the child is almost invariably in bed from the beginning of the symptoms. The second is, that when the patient does take to bed there is fever, with increasing somnolence, and the addition of the symptoms of true meningitis. The usual history of these cases is that a child in previously good health usually without any marked prodromal symptoms develops fever which may be quite high. There may be some headache and sometimes vomiting; the child continues to be about for a day or so, and then becomes bed-ridden, usually complaining of being very tired. The fever continues, the patient becomes somnolent, and this increases while the temperature tends to go down to normal or nearly so. Sometimes there is delirium, sometimes extreme hyperesthesia; the patients may complain

¹ American Journal of the Medical Sciences, June, 1911, p. 788.

of pain in the nape of the neck, there may be marked rigidity, and Kernig's sign may be present. Ocular palsies are common, and there may be slight facial paralysis. There may be symptoms of hydrocephalus. If the patient survives he begins to brighten up after a week or two, and improvement usually takes place slowly. If the patient is caused to stand, there is marked ataxia and vertigo, and the ataxia is the last symptom to improve. Koplik states that the prognosis is for the most part good, except in those cases which involve the nuclei of the nerves controlling respiration. The examination of fluid obtained by lumbar puncture shows a clear or slightly flocculent fluid, without bacteria and with a high percentage of lymphocytes. Examination of the blood shows a leukocytosis which starts with a marked increase of the polymorphonuclears.

POLIOMYELITIS AND HERPES ZOSTER. Garrow¹ calls attention to certain points in common between herpes zoster and poliomyelitis, and from these he argues that there is some etiological connection between the two diseases. In the first place, he points out that in poliomyelitis the lesion is situated in the anterior cornual cells, and in herpes zoster in the posterior root ganglia—that is, in morphologically equivalent parts of the motor and sensory nerve paths. Second, the nature of the lesion is essentially the same in both. Third, the constitutional symptoms are similar, and he has also observed that both diseases were distinctly epidemic at Maryport at the same time.

A DISEASE OF GUINEA-PIGS RESEMBLING HUMAN INFANTILE PARALYSIS. Römer² has observed an infectious disease occurring spontaneously in guinea-pigs, and which may also be transmitted by intracerebral inoculation, in which case the disease begins nineteen to twenty days after the injection. It begins with a slight fever, followed on the third day by diminution in weight and a progressive hypotonia of the hind legs, and sometimes with an incontinence of the urine. Total paralysis follows rapidly, and the animal dies usually between the eighth and tenth days, sometimes earlier and sometimes later.

The disease can only be transmitted constantly by emulsions made from the central nervous system. The virus is preserved in glycerin, passes through the Berkefeld filter, is not visible, and cannot be cultivated. Sometimes the virus may be found in the spleen, the liver, and the inguinal lymph nodes. The lesions are somewhat similar to those found in poliomyelitis in man, and Römer believes that this disease may be used to work out certain problems relating to poliomyelitis, and so avoid the use of animals as expensive as monkeys.

THE SERODIAGNOSIS OF POLIOMYELITIS. Müller³ has made a study of this subject in collaboration with Römer. There exists, in the serum

¹ British Medical Journal, March 18, 1911, p. 621.

² Deutsche medicinische Wochenschrift, June 29, 1911.

³ Ibid., June 15, 1911, p. 1105.

of individuals affected with this disease, antibodies capable of neutralizing the virus, and these antibodies exist in the blood years after the disease has disappeared. Netter and Levaditi have utilized this fact in the diagnosis of the disease. In the epidemic studied, the use of this means of diagnosis made it possible to understand the nature of cases which were not typical, those giving the picture of bulbar paralysis, and also cases of simple febrile disturbance accompanied by gastro-intestinal disorder, but no appreciable change in the nervous system, and also certain poorly developed cases or *formes frustes*. He also believes that a negative result permits one to state definitely that the disease in question is not poliomyelitis. He also believes what most of us believe nowadays, that there is no difference between the sporadic and epidemic form of poliomyelitis. Müller and Römer also had occasion to examine the serum from 3 cases of herpes zoster. This disease, as noted elsewhere, frequently occurs during epidemics of poliomyelitis, and by some has been supposed to be a manifestation of the same infection. The 3 cases tested gave a positive diagnosis, but the reactions in animals were doubtful, and on this point the authors prefer to wait further experimental evidence before deciding on the identity of the cause of these two diseases.

THE DIAGNOSIS OF POLIOMYELITIS BY MEANS OF EXAMINATION OF THE BLOOD AND CEREBROSPINAL FLUID. The older reports on the examination of the cerebrospinal fluid in this disease stated that the fluid is clear, frequently under somewhat increased pressure, and that it often shows a fibrin clot. They also stated that it contained an excess of cells, mostly lymphocytes. Gay and Lucas¹ made a study of the spinal fluid, both in monkeys and in human beings, and found that the changes in the monkey and human being were similar—that is, that in the early examination the lymphocytes predominated, and in the later examination these were replaced by large mononuclears, and in the examination last made the polynuclears began to reappear, the amount of fluid obtainable and the number of cells in it being markedly increased. In monkeys, the number of cells varied between 100 and 300 per cubic millimeter. In the prodromal stages, the increase in the number was even more marked. Flexner and Clark² found that the cerebrospinal fluid at the height of the lesion shows a very slight turbidity or opalescence, due to the increase in white cells, and they call attention to the fact that this is best seen by slightly agitating the fluid. They found that the white corpuscles were partly lymphocytes and partly polynuclears. They also determined that there was an excess of protein matter which was readily detected by applying Noguchi's butyric acid test. They ascertained further that the changes were present in the human being and that they are of great value in the early diagnosis of

¹ Archives of Internal Medicine, September, 1910, p. 330.

² Journal of the American Medical Association, February 25, 1911, p. 585.

the disease. Tuberculous meningitis in some cases might have to be eliminated, and this could be done by very careful examination of the cerebrospinal fluid for tubercle bacilli. As noted in the report of Müller and Römer, the neutralization test may be used to determine whether an attack of the disease is present, the test being made by mixing the blood serum with the filtered virus, incubating the mixture at 37° C. for a few hours, and injecting it into the monkey. Serum from a normal human being has no power to neutralize the virus, while if there has been an attack of the disease, the blood serum possesses this power. The objection to the method is that it necessitates the use of monkeys in large numbers if many cases are studied. Gay and Lucas also studied the blood in monkeys and human beings. In the disease in monkeys, the leukocyte count remains stationary during incubation and the prodromal stage, or it may undergo slight variations due to reasons not determined. In the early stages, the number of leukocytes decreased, and this fall is characteristic of the acute stage of the disease in monkeys. In human beings, there is a moderate to a marked drop in the white blood count, with a lymphocytosis, and it should be borne in mind that this latter is not an uncommon blood find in early life.

Morse¹ believes that the leukopenia, which occurs in animals during the early part of the acute stage, is not a constant symptom in human beings, and that, in many cases, it is replaced by an increase in the leukocytes. In the present state of our knowledge of the changes in the blood cells, we can safely assert that the examination of the blood does not help in the diagnosis of the disease, although it is quite probable that if a series of careful counts were made, including the incubation period, something of importance might be determined.

Lebrado and Recio² reported the finding of a distinct eosinophile in a case in a human being. Gay and Lucas also have noted a slight eosinophile.

NEGATIVE BIOLOGICAL TESTS WITH BLOOD SERUM AND SPINAL FLUID. Wollstein some years ago made a study of the cerebrospinal fluid, using the fixation reaction of Bordet and Gengou; her results were negative. Lebrado and Recio have obtained a fixation reaction in 1 out of 3 cases. Gay and Lucas have tried the fixation reaction with material obtained both from monkeys and from human beings, and their tests for antibodies to the poliomyelitis virus and for antigens to a supposed antiserum were all negative.

POSTMORTEM FINDINGS IN A CASE OF POLIOMYELITIS. Proescher³ has described the findings in a fatal case of poliomyelitis, in which he found, in smears from the spinal cord, bodies not unlike the Negri bodies that are found in rabies. In the cervical section of the spinal cord he

¹ Archives of Pediatrics, March, 1911.

² Sanidad y Beneficencia, Havana, 1910, p. 170.

³ New York Medical Journal, December 17, 1910, p. 1213.

also found protozoa-like bodies, and certain round cysts about which were grouped small round bodies somewhat suggesting the sporulating malarial parasite. The nature of these bodies is not clear, and should be a subject of further investigation.

REACTION OF THE VIRUS IN THE ORGANS. Landsteiner, Levaditi, and Pastia¹ had occasion to make an autopsy upon a fatal case of poliomyelitis in which the disease had begun with vomiting, fever, redness of the throat, and deposits in the crypts of the tonsils. Emulsions of the fragments of the various organs into monkeys resulted in the development of the disease in those injected with the *cord* and the *tonsils*. Also, the monkey injected with portions of the pharynx developed the disease, but survived. Those inoculated with the cervical lymph nodes, the spleen, the salivary glands, and mesenteric lymph nodes survived without developing the disease. It is interesting to note in this observation that the disease began with symptoms of a follicular tonsillitis, and that the virus was recovered from the portions of the tonsils and pharynx. It is very probable that, in some cases, the tonsils and mucous membranes may be the site of entry, and it has already been noted that, in some epidemics of the disease, throat symptoms may be noted at the onset. It is very probable that there are other sites of entry as well.

Flexner and Lewis² have studied the virus in relation to the *tonsil*, the tonsil and the attached pharyngeal mucosa being removed in fatal cases and rendered free from bacteria, not by filtration, but by treatment with 0.5 per cent. solution of phenol (carbolic acid), this treatment having been found by previous experimentation not to destroy the virus of poliomyelitis. Emulsions of tonsils so treated were used to inoculate monkeys, both into the brain and into the peritoneum, and invariably produced the disease; they conclude from this that the virus extends into the tonsils and pharynx of human beings who have died from poliomyelitis as constantly as in monkeys in whom the disease has been produced by intracerebral inoculations.

TRANSMISSION EXPERIMENTS. Some rather remarkable observations have been made by Osgood and Lucas,³ who found that they were able to transmit typical poliomyelitis from the filtrate of the nasopharyngeal mucosa of two monkeys dying without other discoverable infection, respectively six weeks and five and one-half months after the acute stage of the disease. The transmission of the disease by this means during the acute stage has been performed by a number of investigators, but the fact that the virus may live in the mucosa for weeks and even months after the acute stage of the disease has passed, and in animals in apparently perfect health, throws a new light on the possibility of

¹ La Semaine Médicale, June 21, 1911, p. 296.

² Journal of the American Medical Association, November 18, 1911, p. 1685.

³ Ibid., February 18, 1911, p. 495.

there being poliomyelitis carriers, who may be a source of danger and yet pass unrecognized by any of the means which we now have at our disposal. Curiously enough, the virus does not seem capable of demonstration in the nasal secretion. Rosenau, Sheppard, and Amoss¹ have also made investigations in 18 cases, using the buccal nasopharyngeal secretions. They were not able to produce the disease from any of their cases. Dixon² also made the attempt to transmit the disease from the nasopharyngeal secretions in 14 cases, with uniformly negative results. Landsteiner and Levaditi were unable to produce the disease by inoculating monkeys with the nasal secretion from acute experimental cases, and Strauss³ has attempted to reproduce the disease by intracerebral inoculations with nasopharyngeal secretions, and in ten experiments was unable to produce the disease. He also made one experiment with the feces of a patient in the acute stage of the disease, and the result of this was negative.

THE CONTAMINATION OF THE FLY WITH POLIOMYELITIS VIRUS. The most prominent of the insects which have been mentioned as possible carriers of this disease is the fly. The experiments of Flexner and Clark⁴ are of peculiar interest in this connection. They used laboratory bred flies and permitted them to feed on the fresh spinal cord removed from monkeys inoculated with the virus of poliomyelitis. The flies were then removed, a certain number killed at intervals, then comminuted with sand and extracted with salt solution. A bacteria-free filtrate was then obtained by means of a Berkefeld filter. The filtrate was then injected into the brain of the Rhesus monkey. They determined that the flies may harbor the virus in a living and infectious state for at least forty-eight hours. It is possible that they may harbor it for longer periods. Whether the virus is retained merely as a surface contamination or whether it survives in the intestinal tract, will have to be worked out in later experiments.

EXPERIMENTAL POLIOMYELITIS PRODUCED IN MONKEYS FROM THE DUST OF THE SICK ROOM. Neustaedter and Thro⁵ claim to have been successful in causing poliomyelitis in the Rhesus monkey by injecting extracts of sweepings from a house in which 3 different cases had occurred. The sweepings were allowed to stand in normal salt solution, and filtered through a Berkefeld filter. The spinal fluid is withdrawn prior to the injection of this filtrate into the animal, and the injection was made through the brain into the ventricle, 4 c.c. being used. Some of the same filtrate was inoculated into ascitic broth, and proved to be

¹ Boston Medical and Surgical Journal, May 25, 1911, p. 743.

² American Journal of the Diseases of Children, October, 1911, p. 221.

³ Journal of the American Medical Association, April 22, 1911, p. 1192.

⁴ Ibid., June 10, 1911, p. 1717.

⁵ New York Medical Journal, September 23, 1911, p. 613; October 21, 1911, p.

sterile on this medium. Seven days after the injection the monkey became ill, and two days later there was partial paralysis of both hind legs, and on the following day all four legs were paralyzed. This monkey and also others, which were subjected to essentially the same process, showed changes in the cord which were similar to those found in poliomyelitis, and the disease was transferred to other monkeys. They were led to make their experiments from the fact that the disease is one which occurs in dry seasons, and they believe that the nasopharynx is probably the portal of entry of the organism, and they suggest that prophylactic measures should be rigidly carried out in order to check the spread of the disease. These observations are of great value if they can be confirmed by other observers. It would be interesting to know what would happen if sweepings from ordinary rooms were used.

THE EFFECTS OF HEXAMETHYLENAMIN (UROTROPIN) ON POLIO-MYELITIS. Some years ago Cushing and Crowe showed that this drug was partly eliminated into the subdural space. It has been used in the treatment of poliomyelitis in human beings on purely empiric grounds, and as the drug is not administered until paralysis has already manifested itself, with our present methods it is impossible to determine definitely whether it exercises a curative influence or not. Flexner and Clark¹ have carried on a series of investigations in experimental poliomyelitis in monkeys. If the monkeys are given hexamethylenamin before the virus of poliomyelitis is injected into the brain, and the drug is administered by mouth daily after the injection, a certain proportion of the animals so treated, but not all, will show a prolongation of the incubation period (from six to eight days to twenty-four days), and the onset of the paralysis may be entirely prevented. When the drug is administered by mouth and the immune monkey serum by injection into the subdural space, a paralysis can also be prevented, possibly with greater certainty. They have not yet determined whether the animals surviving this method show any greater resistance to reinoculation than untreated animals do to a primary inoculation. If the multiplication of the virus has been suppressed, one would not expect to find an increase in the degree of resistance. It is possible that, starting with hexamethylenamin, a new compound may be produced which will exert even greater action in this regard than the drug as used at present.

SERUM-THERAPY IN ANTERIOR POLIO-MYELITIS. Netter, Gendron, and Touraine,² during the year 1910, tried a method of treatment consisting of the intraspinal injections of serum from patients previously affected with infantile paralysis. They used the serum in some cases twenty-four hours after the onset, and in others, three days, five days, and six days. The serum was obtained from ten subjects who had had the disease at various periods ranging from two months to eleven years.

¹ Journal of the American Medical Association, February 25, 1911, p. 585.

² La Semaine Médicale, May 17, 1911.

Blood was taken from a vein under the usual precautions, the serum separated by a centrifuge and preserved on ice, and always used within four days after it was taken. The amount of serum injected was always less than the amount of cerebrospinal fluid withdrawn by lumbar puncture, usually 7 c.c., and in some cases as much as 15 c.c. One patient received at nine different times 103 c.c., and the remainder, from 18 to 19 c.c., given in three injections. In 4 of the patients, 1 died; and the other 3, according to the statements of the observers, were rapidly and markedly benefited.

Rabies. RABIES IN THE PHILIPPINES. Dudley and Whitmore¹ have contributed an interesting article on this subject. There has been considerable question as to whether rabies occurs either among man or the lower animals in the Philippines, and while considerable clinical evidence has been collected in favor of the view that it exists, previous attempts to demonstrate it scientifically have failed. Curiously enough, the former efforts made to import a strain of fixed virus from Japan were unsuccessful, the virus either not killing the rabbits in Manila at all, or ceasing to do so very soon after its importation. The question arose as to whether the virus of rabies could continue in a viable condition in the Philippines.

Dudley, in a previous report in 1907, collected statistics of 158 deaths from hydrophobia in the human being, and since that time sufficient to bring the number up to 402 reported human deaths. The clinical descriptions of the disease are those as ordinarily known. The question of the existence of rabies was carefully investigated, and the authors found the disease among dogs. They were able to find the Negri bodies in the brain tissue of two dogs and succeeded in carrying the virus from one of these dogs through seven passages in rabbits, and in the brains of these rabbits they were able to demonstrate the Negri bodies and the Lentz passage bodies in the first three passages. They were also able to demonstrate that the disease occurred in human beings by using essentially the same methods. They have also succeeded in transporting the fixed virus from Saigon to Manila both in animals and in neutral glycerin, and have been able to keep the virus at its full virulence.

LATE INFECTION OF WOUNDS BY RABIES VIRUS. Babes and Vasilliu² have made a study of the possibility of infecting scratches and other superficial wounds with rabies. These studies were undertaken on account of the number of persons who applied to antirabic institutes carrying superficial wounds and scratches which had not been produced direct by the rabid animals, but later have come in contact in one way or another with the saliva of the diseased animal. Their researches were made upon dogs. They found that the fresh scratches were easily infected by lightly applying the street virus. In cases in which twenty-

¹ Philippine Journal of Science, November, 1910, p. 455.

² La Semaine Médicale, May 3, 1911.

four hours had elapsed before the virus was applied, the animals did not develop the disease, but it should be noted that if the wounds are upon the head they may be easily infected even after seventy-two hours. One would conclude from this, that if the scratches are upon the head the individual should be treated, but if they are on the body, if twenty-four hours have elapsed before they come in contact with the virus, they need not be treated.

THE USE OF FIXED VIRUS IN THE PREVENTIVE TREATMENT OF RABIES. In 1909 Proescher¹ suggested a method of using freshly prepared fixed virus (*virus fixe*) from the brain of the hydrophobic rabbit. In this series he reported 40 cases; the first 10 patients were given two injections daily, 11 one injection daily for ten days, and the remaining 19 were given one injection daily for six days. The results of this method were so satisfactory that he decreased the doses to one injection daily for five days, and also gave smaller doses. He² now reports 92 cases, and suggests that this method be substituted for the procedure used in most of the Pasteur institutes. As is well known, the original method of Pasteur was to dry the spinal cords of rabbits that had died from hydrophobia; the emulsions of these cords were injected, using fresher and fresher cords, and the entire treatment covering a period of twenty-one days. Högyes, of Budapest, suggested, in place of using cords attenuated by drying, that small amounts of unchanged fixed virus be used instead, and this method is used in some of the Pasteur institutes.

There are two kinds of rabies virus, the so-called "street virus," which is obtained from animals dying of ordinary rabies and which is dangerous to human beings. When this virus is passed through a succession of rabbits, the incubation period of the rabbit gradually lessens and finally reaches a minimum, and this rabies virus is called "fixed virus," or *virus fixe*. It seems that this fixed virus may be injected into human beings without danger of producing the disease, but before any strain of virus is used, one should be perfectly sure that they are dealing with a reliable virus, and one that is thoroughly fixed. It is possible that all of the fixed virus is more or less avirulent to human beings. Ferran suggests the use of 0.3 gram of fixed virus given in five days' time. He sedimented the emulsion, and did not use the sediment, so that the average amount recommended by him was probably 0.15 gram. Proescher has given as much as fifty times the dose suggested by Ferran, but at present he uses 0.5 gram in five days, and he believes that one large dose of the fixed virus will produce immunity in human beings.

A SAFE AND EFFICIENT ANTIRABIC VACCINE. Semple, the director of the Sanitary Research Institute,³ has endeavored to ascertain

¹ New York Medical Journal, 1909, p. 688.

² Archives of Internal Medicine, September, 1911, p. 351.

³ Scientific Memoirs by the Officers of the Medical and Sanitary Departments of the Government of India, N. S., No. 44.

whether animals can be as highly immunized against rabies with the dead as with the living virus.

It will be remembered that Pasteur commenced the treatment for the prevention of rabies with the dead virus, and after a certain degree of immunity was procured, the living virus was injected.

Högyes, of Budapest, introduced what is known as the dilution method, which consists of injecting the living virus at the start, using it very much diluted, and following this with stronger mixtures. He is of the opinion that the rabies toxin does not exist apart from the living virus. Semple found that the rabies virus was easily destroyed by heat, and that a temperature of 50° C. kills a 5 per cent. dilution of fixed virus in fifteen minutes. After a considerable amount of experimenting, it was found that in an 8 per cent. dilution of rabies virus in normal salt solution, the virus was killed by 1 per cent. carbolic acid at body temperature in twenty-four hours, and that if this fluid was then diluted with an equal volume of normal salt solution, one would obtain a 4 per cent. rabies virus in normal salt solution containing 0.5 per cent. carbolic acid. This carbolic acid content is important because injections into human beings should not contain more than 0.5 per cent. From animal experiments, it would seem that this dead virus was capable of producing immunity, and it has the advantage that it can be sent to any place without risk of having its properties injured. In America, the practice of sending the living virus in containers protected from the heat by means of a vacuum has been growing in favor. Semple's method, if subsequent investigation proves it to have the value which he claims for it, will not only simplify the shipping of the virus, but lessen the expense in producing it.

A PECULIAR COMPLICATION DURING THE PASTEUR PREVENTIVE TREATMENT FOR RABIES. Frugoni and Gargiano¹ have called attention to a phenomenon which they have observed in the medical clinic in Florence. About the middle of the treatment, which lasts twenty-four days, they observed, some six or ten hours after the injection, a round or elliptical swelling, uniformly red. The swelling was hard, unelastic, painful, and adherent to the adjoining deeper tissues. There was increase in the local temperature, but no general fever. This swelling reached its most intense period some twenty-four hours after it started, and disappeared after three or four days. There were no other skin manifestations, but occasionally a slight and not constant swelling of the neighboring lymph nodes. They have observed it from 20 to 25 times in some four to five hundred cases that have been treated.

It is interesting to note that it affects both sexes alike and all ages, but is more common in fat individuals. Other individuals injected with the same emulsion did not show any reaction, and it never occurred in the earlier days of the treatment.

¹ Berliner klinische Wochenschrift, February 6, 1911, p. 254.

The description is very similar to the manifestations which sometimes follow the second injections of serums. One not familiar with this phenomenon would be inclined to believe that they had to deal with a severe infected wound, but in none of the cases was there any tendency to suppuration.

THE MICROÖRGANISM OF RABIES. There have been numerous attempts made to determine the nature of the virus of rabies, especially as the virus does not pass through a filter, according to most observers, which would indicate that it is caused by an organism which one might be able to demonstrate by some special method. Many investigations have been made, among which may be mentioned the finding of cocci in bacilli forms by Babes and J. Koch, and the description of certain bodies by Negri.

The latest communication is by Proescher,¹ of Pittsburg, who, by dissolving the brains of animals dead from rabies by the antiformin method (see Tuberculosis), found in smears, microorganisms in the form of bacilli $\frac{1}{2}$ to 1μ in length, and $\frac{1}{3}\mu$ thick. These were either isolated or arranged in chains or groups, and stained according to Gram's method. Besides, there were larger oval and rounded forms arranged in pairs, chains, or groups. He was able to find these organisms in the brains of 12 dogs infected with street virus, but they were only found in 3 out of 12 rabbits infected with fixed bacilli. As a control the normal brain of the dog, rabbit, guinea-pig, and human being were used, also pathologic chains of brains made of human beings were used, but the organisms were found in none of these.

Further investigation, of course, will be necessary to determine the nature of these organisms, whether they bear a constant relation to the disease.

The Distribution of the Rocky Mountain Spotted-fever Tick. As early as 1902 the theory that the wood tick, *Dermacentor venustus*, Banks, acts as a carrier for this disease was advanced by Drs. Wilson and Chowning, and the experiments of the late Dr. H. T. Ricketts, demonstrated conclusively that the tick was responsible for most, if not all, of the disease in man. This was considered in *PROGRESSIVE MEDICINE*, March, 1910, p. 161.

The disease occurs in the Bitter Root Valley in western Montana in its most virulent form, the mortality reaching as high as 70 to 80 per cent. In southern Idaho, the mortality is about 5 per cent., and this milder form has also been reported from Wyoming, Utah, and Nevada, and it is supposed to have occurred in certain sections of Colorado and Oregon.

F. C. Bishop,² of the United States Department of Agriculture, has

¹ New York Medical Journal, April 22, 1911, p. 783.

² Circular 136 of the Bureau of Entomology, United States Department of Agriculture, March 31, 1911.

made a report upon the distribution of the wood tick, and observations have been made by R. A. Cooley, and others. The tick was found in California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming, and this is well shown in the accompanying map taken from Bishop's article. The abundance of the tick is greatly influenced by the presence of numerous host animals, and also by the protection as is afforded by timber. They have been found especially abundant in localities where there is much fallen timber and brush. The immature ticks have been found to feed almost exclusively on the small mammals, while the adults feed on large domestic animals. The absence or scarcity of either of these classes of hosts greatly influences the number of ticks occurring in any given region.

It has been pointed out by Bailey that the distribution of the tick corresponds very closely to the distribution of the subgenus of the ground squirrels, namely, *colobotis*.

While it is not desirable to cause any alarm concerning the danger from the Rocky Mountain spotted-fever, methods might be considered to prevent the introduction of the tick into localities in which it does not already exist, and methods might be taken for lessening its frequency in regions where it has already been found.

Maver¹ has studied the question as to whether other varieties of ticks could not act as an intermediate host for the parasite. Experiments were made with guinea-pigs and two different strains of the virus of the disease. It was found that ticks from six different localities, including some from Utah, Missouri, and Massachusetts, were capable of transmitting the disease, so that it was quite possible that the disease may spread from the region in which it now is found, and other varieties of ticks than those ordinarily associated with the disease may act as hosts. The same observer² has made a further demonstration of the fact that ticks in nature transmit the disease. The experiments included observations with some 656 ticks collected in Montana and Idaho, and these were taken from cows, bushes, and vegetation. These ticks were capable of transmitting the disease to guinea-pigs.

Moore³ has also made some elaborate studies to determine the minimum duration of feeding necessary for a tick to infect a guinea-pig, and this was found to be an hour and forty-five minutes, the average time being about ten hours, and the ticks which feed for twenty hours almost constantly caused infection. The time necessary to infect a tick was approximately twenty-five hours. He states that he believes that in the ticks obtained from nature the duration of feeding necessary to infect the tick and the incubation period in the tick would be much less.

Davis and Peterson⁴ have made some studies in the complement

¹ Journal of Infectious Diseases, April 12, 1911, p. 322.

² Ibid., p. 327.

³ Ibid., p. 339.

⁴ Ibid., p. 350.

deviation test in this disease. They were able to obtain only one positive result, and believe that negative results obtained were probably explained by the small quantities of organisms present in any one preparation of antigen. From other observations, they believe that it may be found that the virus of spotted fever and the hog cholera bacillus may be closely related.

Scarlet Fever. EXPERIMENTAL SCARLET FEVER. Bernhardt¹ reports some interesting experiments upon the transmission of scarlet fever to various forms of monkeys. He used the *Macacus rhesus*, *Macacus cynomolgus*, *Cercopithecus griseus*, *Cercopithecus fuliginosus*. This method is to take the coating from the tongue in early stages of the disease, to mix this thoroughly with normal salt solution, and thoroughly shake it at room temperature for an hour. Four cubic centimeters are injected subcutaneously in the groin, and some of the emulsion is placed in the mouth and rubbed over the tonsils and tongue. Following this there was a rise of temperature, swelling of the lymph nodes in the groin, and on the fifth day the animal was markedly affected. The swollen glands were removed, and treated in the same manner as the scrapings from the tongue, and injected into another monkey. In this way he was able to transmit the disease through at least three monkeys. Sometimes streptococci were present in the tissues, and sometimes they could not be demonstrated. The material used was sterile in cultures, and when injected into mice did not produce any disturbance.

The symptoms in the monkey were somewhat similar to those seen in children, consisting of a rise of temperature, swelling of the lymph nodes, thickly coated tongue and an eruption, particularly noticeable on the face, neck, and shoulders. This was followed by a desquamation of the skin. He concluded that in the scrapings from the tongue, in the lymph vessels of the skin, and in the lymph nodes, there is a virus present which will produce scarlet fever in monkeys, and this practically resembles the scarlet fever in human beings. The incubation period was variable. The virus transferred the disease from one animal to another without the presence of any bacteria, as far as could be made out by the present methods of examination, and always produced the same clinical picture. A general infection can also be produced with the mouth as the entrance point of the virus, and this without any injury to the skin. He believes that the virus belongs to the group of filterable viruses.

Cantacuzène² succeeded in producing similar results by injecting tracheobronchial nodes, pericardial exudate, and blood into monkeys.

The pericardial exudate and blood were free from any mixture of bacteria.

¹ Deutsche medicinische Wochenschrift, April 27, 1911, p. 791.

² No. 10 der Compt. rend. hebd. des séances de la Soc. de biol. vom 17 March, 1911.

Landsteiner and Levaditi,¹ together with Prasek,² have also reported their work in transmitting scarlet fever to chimpanzees. They conclude that it is possible to transmit scarlet fever to these animals both by means of placing the scarlet fever products in the throat, and by inoculation under the skin. The resulted disease consisted of an angina, characterized by redness and swelling of the mucous membranes of the pharynx and tonsils, and the formation of thick, grayish-yellow deposit on the tonsils; there was also swelling of the papillæ of the tongue. There was a generalized erythema, resembling that of scarlet fever in the human being. There is a febrile reaction, and in some streptococcus abscesses formed at the site of inoculation. The first indication of disease was the angina which manifested itself on the third day after the inoculation. One of their animals died, and the autopsy showed the same lesions of the skin and kidneys as are found in the same disease in human beings. There was swelling of the lymph nodes. They also attempted to transmit the disease by using the streptococci isolated from one of their cases, but injection of this into the lower monkeys produced only a slight local abscess, and one injection directly into the vein was not followed by any manifestation. From the result of their experiments and those of other observers, it does not seem that the streptococcus is the cause of the disease, but, as most of us have always believed, merely a rather constantly present complication. They attempted to produce the disease in the lower order of monkeys, such as were used by Bernhardt and by Cantacuzène; they were not, however, able to obtain the same results as these authors. These experiments are of particular interest at this time, when so much work is being done upon disease caused by the filterable virus, and the results are particularly gratifying to those of us who believe that the streptococcus is merely a secondary infection, and has nothing to do *per se* with the production of scarlet fever.

THE STREPTOCOCCUS IN SCARLET FEVER. Schleissner³ has made a study of this subject in 108 children. He did not find any connection between the presence of streptococci in the blood and the prognosis. Indeed, in some of the benign cases the streptococcus was demonstrated. In 60 of the cases examined, the streptococcus was found present in the blood, while in 48, in spite of repeated examinations, it could not be found. In the positive cases it was not unusual to obtain it on the fourth and third days, and even the second day of the disease. It is curious to note that the complications were slightly more frequent in the children in whom the streptococcus could not be demonstrated. In the 60 children with the streptococcus, 19 (31 per cent.) suffered with some complication, such as nephritis, endocarditis,

¹ Gazette des Hôpitaux, May 4, 1911, p. 784.

² Annales de l'Institut Pasteur, October, 1911.

³ Zeitschrift für Kinderheilkunde, t. iii, f. 1, p. 28.

adenitis, or arthritis. In the 48 children in whom the streptococcus was not found, 17 (35 per cent.) had complications. In the desquamated skin, the streptococci could not be demonstrated with any degree of certainty, either by examination of sections or by means of cultures. They could not establish any relation between the thermic curve and the presence of streptococci in the blood. In spite of all these negative facts, Schleissner is not inclined to attribute to this microbe a purely secondary role.

A NEW DIAGNOSTIC SIGN FOR SCARLET FEVER. Leede¹ has reported the results of his investigations in the production of hemorrhages into the skin by means of blood stasis caused by pressure. In 1907 Hecht suggested pinching up the skin of the chest between the thumb and forefinger, holding it with pressure for five or ten seconds, observing the petechial hemorrhages which were marked in scarlet fever. In 1909, Rumpel² mentioned the method used below in the diagnosis of scarlet fever. Leede uses a broad rubber band around the arm above the elbow, placed on sufficiently tight to cause marked venous stasis, so that the hand becomes blue, but not sufficiently tight to shut off the pulse. After ten or fifteen minutes' time the band is loosened, and the skin is examined, particularly the flexure surface of the elbow. If the skin is stretched so as to make it anemic, the petechiæ are seen quite easily. Hecht regarded the reaction as negative unless he got a very marked hemorrhage, but Leede is inclined to believe that the test is positive if there are only a moderate number of petechiæ present. He believes that this is caused by a very marked change in the capillaries, which renders them more susceptible to pressure. It was found in some 200 observations, and the sign was absent only once, and that was in the case of a very fat girl, and he believes that the layer of fat may have interfered with the pressure. The same phenomenon may be noted in measles, although reports of cases are not very numerous. One would be inclined to regard this sign with considerable suspicion until it has been more thoroughly worked out, as it is quite probable that in most of the severer infectious diseases there is an injury to the capillary walls which should render this sign positive. A point of considerable interest is the length of time which this lasts, the majority of the patients showing it six or seven weeks after the scarlet fever. In one case, in which there was hemorrhagic nephritis and other complications, the sign was found 104 days after the beginning of the disease.

Bennecke³ has commented upon the above sign, and calls particular attention to the fact that when the test is negative it is a point against the disease in question being scarlet fever, but when it is positive one has to take into consideration not only scarlet fever, but other infections in which the sign may be sometimes noted.

¹ *Münchener medicinische Wochenschrift*, February 7, 1911, p. 293.

² *Ibid.*, No. 27, p. 1404.

³ *Ibid.*, April 4, 1911, p. 740.

It is particularly interesting to note, in this connection, that Mayr¹ does not believe that this so-called Rumpel-Leede sign is at all pathognomonic of scarlet fever. In the dermatological clinic of the University of Heidelberg he studied 100 patients, 63 men and 37 women, suffering from various skin or venereal diseases. Twenty of these, 6 men and 14 women, gave a positive result, the petechiæ making their appearance in from three to ten minutes after the application of the elastic band. Of these 20 cases, 10 had been treated for syphilis, 5 had lupus, 2 eczema, 2 psoriasis, and 1 gonorrhea.

Leede,² in commenting on the above observations of Mayr, states that he did not claim that the Rumpel-Leede phenomenon was pathognomonic of scarlet fever, but that it was perhaps the most constant symptom of scarlet fever, and that it appears in nearly 100 per cent. of all cases, and that it may be brought out by a blood pressure of from 50 to 60 millimeters of mercury.

Marbè³ has called attention to a sign which is of some value in the diagnosis of scarlet fever, particularly in adults, and that is the condition of the folds of the knee and elbow. He found that these folds were constantly red and shiny and somewhat larger than in normal subjects. In doubtful cases he considers the sign of considerable value.

A NEW SCARLET FEVER ORGANISM. Vipond⁴ has carried on a series of investigations in regard to the cause of scarlet fever. He was able to isolate from the lymph nodes from typical cases of scarlet fever the bacillus which he believed to be the cause of the disease. It grows rapidly on the ordinary culture media, and on injection into monkeys produced a febrile disease, characterized by a red rash, enlargement of the lymph nodes, congested throat, and typical scarlet fever tongue. From the monkeys dead from this disease the bacilli were recovered, and Vipond believes that he has at last isolated the specific organism.

On the other hand, Köhner⁵ has made a study of the glands of 26 patients with scarlet fever, including one case cultured at autopsy, and in not one of these cases was he able to demonstrate any organism like that isolated by Vipond. Various pus organisms were found, but nothing new.

THE TONGUE IN SCARLET FEVER. The well-known appearance of the tongue in scarlet fever, which during the first three or four days of the disease is covered with a thick, whitish or yellowish-white coat with swollen papillæ and little red spots. At the end of about four days it begins to peel along the edges and at the point, and by the fifth or

¹ Münchener medicinische Wochenschrift, June 20, 1911.

² Ibid., August 1, 1911, p. 1673.

³ La Semaine Médicale, November 30, 1910, p. 575.

⁴ Canadian Medical Association Journal, 1911, No. 7, p. 817.

⁵ American Journal of the Diseases of Children, November, 1911, p. 329.

sixth day is almost entirely and completely denuded, and then shows a bright red color on which the swollen papillae are very prominent. By many this has been held to be a pathognomonic sign of scarlet fever. It would hardly seem necessary to call attention to the fact that this is not so, and yet there is no doubt that many physicians place entirely too great confidence in this sign.

Vladimirov,¹ of Moscow, has called attention to the fact that this type of tongue may be found in other conditions, and he has seen it in measles, in gastritis, and in some other conditions. Sometimes the tongue may be colored by dyes used in candies, or other foods, but the absence of the swollen papillae make the diagnosis in this case easy.

THE LIVER IN SCARLET FEVER. Attention to the condition of the liver in scarlet fever has been attracted by the monograph of Renard,² and Hildebrandt³ has also made a study of this question, and has found that in a great majority of cases there is an increased elimination of urobilin. This urobilinuria runs along about parallel to the fever, and usually disappears with it. During convalescence there is no apparent increase in the excretion of urobilin. This, perhaps, may mean the existence of a concomitant parenchymatous hepatitis, and Hildebrandt believes that it is of some value in the diagnosis between scarlet fever, measles, diphtheria, and simple angina, the presence of urobilin being regarded as a sign in favor of the diagnosis of scarlet fever.

Sleeping Sickness. **SLEEPING SICKNESS IN THE ANTELOPE.** Bruce, Hamerton, and Bateman⁴ have made a study of the question of whether some of the other animals besides man and crocodiles may act as a host for the virus of sleeping sickness.

Man and domestic animals have been removed from the Lakeshore of the mainland since September, 1909. The effect of this depopulation has been to make a two-mile area along the northern shores of the Lake virtually a game reserve, in which various species of large game abound. Among others, small herds of antelope may be seen grazing on the grassy hillsides overlooking the Lake.

Notwithstanding the removal of man and his domestic animals, the Lakeshore *Glossina palpalis* continues to infect susceptible animals with sleeping sickness. The Sleeping Sickness Commission, therefore, determined to study the following questions:

Can antelope be infected with sleeping sickness by the bites of laboratory-bred and laboratory-infected tsetse flies?

If antelope can be infected with the virus of tsetse flies, can they transmit the infection to laboratory-bred tsetse flies when they are allowed to feed upon them? Further, if these flies become infected, can they transmit the virus to susceptible animals?

¹ La Semaine Médicale, April 26, 1911, p. 194.

² Ibid., March 29, 1911, p. 14.

³ Münchener medicinische Wochenschrift, November 29, 1910.

⁴ Journal of Tropical Medicine and Hygiene, March 1, 1911, p. 65.

How does the sleeping sickness affect the health of the antelope?

Lastly, do antelope living in the fly area become naturally infected with the sleeping sickness?

The Commission, after studying the question, found out that the water-buck, bush-buck, and reed-buck can readily be infected by the human strain of the trypanosome of sleeping sickness by the bites of infected tsetse flies, that have been bred in the laboratory and infected in the laboratory, and that one exposure to the bites of infected flies is sufficient to infect antelope with the virus of sleeping sickness.

Even though the blood of an antelope may be proved to be infected with the trypanosome, careful and continued examination over prolonged periods may fail to reveal the presence of the parasite in the blood. The incubation of the sleeping sickness in the antelope is probably seven days.

These infected antelope may transmit the infection to laboratory-bred tsetse flies, and this transmission may occur at least eighty-one days after the last feed of the infected flies on a buck. Flies so infected are capable of transmitting the virus to susceptible animals. Quite an appreciable number of tsetse flies become infected with the virus when they feed on antelope suffering with this disease. Up to the present time no antelope have been found to be naturally infected, but it would seem from these experiments that it is quite possible that the antelope serve as a means of keeping up the infection.

Bruce, Hamerton, and Bateman¹ have carried on a series of investigations to ascertain whether the domestic fowl of the Uganda may act as a reservoir for the virus of sleeping sickness, and they came to the conclusion that these animals do not serve to keep the disease going.

RESEARCHES ON THE DEVELOPMENT OF THE TRYPANOSOME GAMBIENSE. Bruce, Hamerton, Bateman, and Mackie² published the results of their experiments, the object of which was to try to discover if there is any definite cycle of development in the trypanosome of sleeping sickness in the tsetse fly (*Glossina palpalis*), and if the late or renewed infectivity of the fly coincides with any phase in this development. Flies that had been bred in the laboratory were allowed to feed on an animal whose blood contained numerous trypanosomes, and at the end of various times the flies were killed and their intestinal contents examined. After the infective feed or feeds, the flies were fed every day on a healthy animal so that by the appearance of the trypanosomes in the animal's blood the date on which one or more of the flies became infective could be arrived at. They determined that the proboscis of the fly does not become involved in the development of the Trypanosome gambiense, as is the case of some of the other species. A few days after an infective feed the trypanosomes disappear from the great

¹ Journal of Tropical Medicine and Hygiene, April 1, 1911, p. 97.

² Ibid., July 1, 1911, p. 196.

majority of flies, but in a small percentage this initial disappearance is followed by a renewed development. After a very short time, the flies which are fed on an infective animal become incapable of conveying infection by their bites, and this non-infectivity lasts for about twenty-eight days, when a renewed or late infectivity takes place, and when this occurs the fly may remain infective for at least ninety-six days. With this renewal of infectivity it was found that the salivary glands were invaded, and the type of trypanosome found in these glands when the fly becomes infective is similar to the short, stumpy form found in vertebrate blood, and it is believed that this reversion to the blood type is an essential in the infective process.

Smallpox. SMALLPOX IN THE UNITED STATES. Trask¹ has made a study of the prevalence and geographic distribution of smallpox for the year 1910, and there were a greater number of cases than in the preceding year, the total being 30,352, with 415 deaths. These cases were reported from thirty-six States and the District of Columbia. The only State furnishing complete information, and in which no case was reported was Connecticut.

A remarkable feature of smallpox, as it has occurred in the United States during the past ten years, is the mildness of the disease and the small number of deaths. From the States furnishing complete information there was a combined estimated mid-year population of 54,435,700. This furnished 23,552 cases of smallpox, with 385 deaths, an average of 43.27 cases for each 100,000 inhabitants, and 1.63 deaths in each 100 cases. When this is compared with the death rate as seen in epidemics abroad, where the deaths vary between 15 to 40 for each 100 cases, the mildness of the disease in this country is very striking. Some have tried to explain this on the ground that the disease is mild on account of the people being well protected by vaccination, and that those not vaccinated had inherited a certain degree of immunity from parents or grandparents who had been. This is hardly possible, as vaccination has never been practised in the United States to such an extent that everybody has been vaccinated, and many of those who have been vaccinated have never had the vaccination to take.

In Germany, where vaccination and revaccination have been thoroughly carried out since 1875, smallpox has been almost eliminated, and yet the cases which have occurred show the usual mortality. In 1906 there were 256 cases of smallpox in Germany, with 47 deaths; and in 1907, 345 cases with 63 deaths. The case mortality is approximately 18 per cent., while in the United States in 1909 the mortality was considerably less than 1 per cent. Contrast, however, the difference in the number of cases to the population. The number of inhabitants in Germany is approximately 60,000,000.

¹ Public Health Reports, June 23, 1911.

Smallpox in the United States, however, has not acquired permanent mildness in character, as is shown by the fact that in certain localities very virulent outbreaks have been reported. In Cleveland, for example, the death rate was 16.13, and in Oklahoma County, Oklahoma, 54.05 per 100 cases. Two maps are published in the report, the first showing the number of smallpox cases actually occurring. The second map shows the distribution of cases according to the population. The number of dots in each state showing the actual number of cases of smallpox reported for each 100,000 inhabitants. In the States which are blank and contain a question mark, complete reports are not available. These maps show the great importance of extending the registration area of the United States so that complete information regarding infectious diseases, as well as other health matters, may be obtainable. There is no reason to believe that in the states left blank the smallpox incidence is any less than in the neighboring states.

SMALLPOX AND VACCINATION. It would seem scarcely necessary to mention this subject in a review of this kind, yet one so often has to bring forth facts to prove the value of a vaccination, that I have been tempted to quote the following statements from an article by Sandwith:¹

1. There has been a marked fall in the mortality from smallpox in all countries dating from the time of introduction of vaccination.

2. The vaccinated suffer much less from smallpox than the unvaccinated. Medical men, for instance, have a well-proved immunity, though in scarlet fever, against which doctors have no special protection, the statistics show that 59 per 1,000,000 die, as against 16 per 1,000,000 of the general population.

3. The age incidence of smallpox is quite different since the introduction of vaccination. Formerly most children took it, and in Gloucester, where 85 per cent. of the children were unvaccinated, 64 per cent. of the patients in the smallpox epidemic of 1898 were children under ten years of age. Today, where infantile vaccination is thoroughly carried out, most of the patients are adults; for instance, in Glasgow in 1900 only 5.5 per cent. of 1730 smallpox cases were under the age of ten years, and of these children two-thirds had never been vaccinated.

4. The vaccinated, even if not efficiently protected by revaccination, have a much lower death rate when attacked by smallpox than the unvaccinated. In the London epidemic of 1900-1901, 9659 cases were treated in the smallpox hospitals of the Metropolitan Asylums Board, and of these 11.5 per cent. of the vaccinated and 33.1 per cent. of the unvaccinated died.

5. Systematic successful revaccination protects from smallpox. The German Government in 1874 made vaccination obligatory during the

¹ *Lancet*, December 24, 1910, p. 1825.

first year of life, and revaccination at puberty. Since 1875 there have been no epidemics of smallpox in Germany, and the disease there is almost extinct. It is frequently introduced by foreigners, particularly on the Russian and Austrian frontiers, but it can find no resting place. In Prussia, where the population has been steadily increasing from 33,000,000 to 35,000,000, the smallpox deaths for six years have varied from 10 to 41, being an average of considerably less than 1 per 1,000,000. This figure compares well with the year 1872, when 2700 Prussians per 1,000,000 died from smallpox.

6. In many smallpox hospitals, it has been necessary to keep healthy children for weeks in the wards, while their mothers underwent the disease; the children remained healthy, and were protected by only one thing—prompt vaccination.

VACCINATION RESULTS IN CUBA AND THE PHILIPPINES. The experience in Cuba and the Philippines show perhaps more conclusively than in other countries, with the exception of Germany, the value of vaccination in the prevention of smallpox.

Smallpox has been endemic throughout the island of Cuba¹ for many years, and as there were no records kept during the Spanish administration there is no way of telling just how many people died, although one can get a fair idea from the mortality in Havana, where statistics are available for the past forty years. The number of deaths varied greatly, several years passing without any, or at other times were over a thousand a year when the normal mortality from smallpox ran into the hundreds. Vaccination had been introduced into Cuba as early as 1804, but, with a few exceptional years, was never practised extensively. In 1901 a commission was appointed to revise the vaccination law, and in the same year the new regulation was put into effect by the military governor of Cuba. The result of this was that by the end of the year 1901 Cuba was free from smallpox, and the disease has not reappeared up to this date. The vaccination law is sufficiently strict to result in vaccination in almost all, if not all, of the population, and although the island has been free from smallpox the practice of vaccination has been kept up, there being over 80,000 vaccinations reported in the year 1910.

In the Philippines,² the results have been just as striking. During the Spanish administration there were large numbers of cases of smallpox, so many, in fact, that large temporary hospitals were erected. Each year during the dry season the mortality was very high. It was estimated that the annual mortality from smallpox has been about 6000 a year in the six provinces near Manila. Systematic vaccination was completed in 1907, and during the last five years there have been no deaths in Manila from smallpox, and the few scattered deaths which have occurred have all been in persons not protected by vaccination.

¹ Villoldo, Public Health Reports, April 14, 1911, p. 495.

² Heiser, Public Health Reports, March 10, 1911, p. 277.

Similar conditions do not prevail all over the islands; for example, in the province of Cebu, prior to 1905, there were from 3000 to 4000 deaths each year from smallpox. In 1905 and 1906 there was a systematic vaccination of the 650,000 inhabitants, and in 1907 there were only 94 deaths. In the following two years the vaccination was not done as energetically, and in 1909 smallpox again became bad, and there were 736 deaths, over 90 per cent. of which were in unvaccinated children. Vaccination was again renewed with increased vigor, and since that time smallpox has been practically absent. In the province of Bataan, in the town of Bagac, through a series of unfortunate circumstances, vaccination was suspended during a period of nine years. In 1905 there was a widespread epidemic; a thorough vaccination was done and within two weeks after it was completed new cases ceased to appear, and the town has remained free from smallpox since.

SMALLPOX OR MILKPOX? In connection with the mild smallpox that has been observed in the United States, it is interesting to note a paper by Ribas,¹ who describes a disease prevailing in several localities in Brazil, and this disease had a low mortality and was less severe among children than grown people. There was an absence of secondary fever, pustules formed early, and there was no smallpox odor. Ordinary vaccination was tried as the disease resembled smallpox, and it was found that this prevented the spread of this disease, which was called *alastrim* or smallpox, because the eruption usually appeared on the third day of the illness, first as a rash, which in a few hours became papular and then vesicular. The eruption at this stage had a shotty feel. On the fourth day the vesicles became purulent in appearance, and afterward pustular. Subsequently the vesicles became more milky, and sometimes had the appearance of white wax. They became pustular upon the fifth day, began to dry on the sixth day, and most of them formed scabs. As a rule, scars were not present, and when they were, were irregular and shallow. There is no reason to believe that this disease is anything but a mild atypical smallpox, such as has been described on many different occasions, and which so frequently leads to confusion.

PURE CULTURES OF THE CYTORRHICTES VACCINÆ. Siegel² has reported his success in obtaining the supposed parasite of vaccinia in pure culture. The small bodies which have been described by so many different authors, and which can be reproduced by inoculation of vaccine lymph into the cornea of a rabbit and which bear the name at the beginning of this paragraph, are generally conceded to be the cause of cowpox or, if not the cause, at any rate, the constant accompaniment. Siegel was able to demonstrate in the blood and in the spleen of vaccine calves the presence of these cocci, and by means of special media was

¹ *Journal of Tropical Medicine and Hygiene*, July 15, 1911, p. 214.

² *Centralblatt für Bakteriologie, Originale*, July 15, 1911, p. 406.

able to grow them. These cocci can be differentiated both by their morphological and biological properties. They grow best at a temperature of 25° C., and in the youngest forms, and on certain special media, show specially small bodies which may be changed into much larger ones and become encapsulated. He believes that these smallest bodies are identical with the small bodies found in the cornea of rabbits following the inoculation of vaccine lymph—the so-called *Cytorrhcytes guarnieri*. By the inoculation with pure cultures of this organism, Siegel was able to produce exactly the same anatomical changes in the corneal epithelium of the rabbit as was found following the inoculation of vaccine virus, and he was also able to demonstrate small bodies which he believes to be identical with the *Cytorrhcytes guarnieri*. His experience in inoculating a human being was limited to one experiment, and that was in an individual who had already been vaccinated four times. At the site of inoculation there appeared a small inflammatory swelling, but no typical papule or vesicle; at the end of five days this had apparently disappeared. At the end of twelve days, however, general symptoms of considerable severity made their appearance, chiefly fever and unbearable headache, and at this time there appeared discrete vesicles on various parts of the body, particularly upon the abdomen and over the scalp and face. This lasted several weeks, and on account of this experience Siegel did not feel justified in continuing experiments upon human beings. These results, however, may serve as a stepping-stone to future investigations which may do much to clear up the vexed problem of smallpox and the allied diseases.

Infection with *Strongyloides Intestinalis*. Gage¹ has reported an unusual instance of infection with this parasite, in which the larvæ were found in the sputum. The patient had been admitted to the hospital with the diagnosis of pneumonia. His temperature promptly dropped to normal, but because his general condition did not improve, and because of impaired resonance and later expectoration, tuberculosis was suspected. The patient eventually died, after having been in the hospital two months. The mucus from the duodenum contained large numbers of the adult worms and larvæ, and there were numerous areas of fresh bronchopneumonia throughout the lower lobes of the lungs, and sputum taken from the trachea and bronchi contained a few larvæ. Gage also mentions the fact that he has seen the larvæ in the stools from 14 other patients, and he details the results of the histological examination of the postmortem material and also his experience with the cultivation of the parasite.

There is some difference of opinion regarding the frequency of strongyloides infections in the United States. Baetjer believes that the infection is rather uncommon, while Stiles is inclined to believe that it is

¹ Archives of Internal Medicine, April, 1911, p. 561.

not infrequent, especially in the southern states. Gage examined the stools of 200 students at Tulane University, and found that 2 per cent. of them were infected with this parasite, which may be taken to indicate the prevalence among apparently healthy individuals. Gage states that men who examine stools chiefly for hookworm eggs and amebæ, find the larvæ so often that they attach very little importance to their presence.

Infection occurs both by mouth and through the skin. Wilms was able to infect a patient by feeding the larvæ, and animals can also be infected, although this method sometimes fails. It has been shown, however, that larvæ penetrate the skin, and animals as well as man can be infected in this way. The lesion caused from the skin is similar to the ground itch caused by the uncinaria. It is impossible to say which is the more common mode of infection. Gage believes that the frequent occurrence of strongyloides larvæ in the stools of patients suffering from amebic dysentery may be taken to indicate that infection by way of the mouth is the usual one. Patients are known to have larvæ in the stools for years, and it is possible that the patients may reinfect themselves.

The parasite was first described in cases of Cochin-China diarrhea. Whether it is the cause of this disease is a subject still under discussion, but there can be no doubt but that the strongyloides is pathogenic, and is the cause of some of the diarrhea in the United States, particularly in the southern part. While not all persons harboring this parasite have diarrhea, the proportion of those who do is large enough to convince physicians who see many cases that the disease is due to the strongyloides. Many of the patients deny having diarrhea, and, in fact, will say that they are constipated; but further questioning will bring out the fact that they have periods lasting a day or two when the stools are soft, unformed, even fluid, and of increased frequency. In the intervals the patient is normal or may be constipated. When there is a diarrhea, it is chronic and intermittent, and often very suggestive of amebic dysentery. The attacks occur from once every few days to once a month, and last one or two days. In the severer cases the diarrhea may be almost continuous. The desire to go to stool is often sudden and very urgent, even when they are of normal consistence, and this symptom is exceedingly suggestive of infection by the strongyloides. There is usually a mild anemia, the hemoglobin ranging from 70 to 90, and, as a rule, a mild eosinophilia, although this may be absent. In some cases a very marked eosinophilia is present.

The *treatment* of the disease is rather unsatisfactory, and opinions differ as to the value of different drugs. In some instances a soluble diet seems to be an aid. The anthelmintics ordinarily administered are beta-naphthol bismuth, thymol, male fern, santonin, salol, and ipecac has also been tried apparently without much success. One reason for

the failure to get rid of the parasites consists in the reinfection of the patient. Larvæ which had penetrated the intestinal walls would not be affected by an anthelmintic, and on again reaching the intestines would develop into adults, so that in a short time larvæ would appear in the stools even though all the adults were killed at the time the anthelmintic was given. The treatment should therefore be repeated for a long time at intervals in order to kill the parasites which are beyond the reach of any single course of treatment.

Darling¹ has made a study of these parasites in the Canal Zone, and from observations made in the Insane Division he estimated that: 18 per cent. of all patients were infected with strongyloides; 20 per cent. of the native patients were infected with strongyloides; 6.4 per cent. of the non-native patients were infected with strongyloides; 21.3 per cent. of the male patients were infected with strongyloides; 15.9 per cent. of the female patients were infected with strongyloides; 28.5 per cent. of the very dirty patients were infected with strongyloides; 31.7 per cent. of the patients aged over fifty years were infected with strongyloides.

He also includes observations upon the nature of the parasite, and has studied the external factors that influence its viability or growth.

The only effect of light was to cause them to segregate, sometimes they were in the warm spots of the slide and sometimes in the shade. On drying they segregate in the sun where there is moisture. When the films become entirely dry the larvæ are killed, but if there is the slightest trace of visible moisture they may be revived upon the addition of water. Sufficient exposure to cold, either interferes with the development or kills the larvæ. If kept at a temperature of 44° F. for twenty-four hours or more they fail completely to develop and the larvæ are all dead after two or three days. Cultures kept at 58° F. fail to develop, and most of the larvæ die within three days, although, if alive, they develop when removed to room temperature.

Darling confirms the opinion of Grassi and Calmette, that the strongyloides infections in man and animals in the Canal Zone are not causative factors in the production of diarrhea (see above). He believes that it is possible that they may cause a certain degree of anemia, but it is not possible to determine the amount, owing to the association of the hookworm disease or malaria.

Fourth of July Tetanus. Since 1903, the *Journal of the American Medical Association* has been compiling the results of the Fourth of July celebrations, with the result that there has been a great falling off in the number of deaths and injuries, and particularly in the number of cases of tetanus. In cities like Baltimore, Washington, Cleveland, and Trenton, the accidents have been practically done

¹ Journal of Experimental Medicine, 1911, vol. xiv, No. 1.

away with, owing to the strict enforcement governing the celebration of the Fourth, while in other cities, as Chicago, New York, and Boston, although there has been a reduction, the number of accidents still remains high. The report for 1911¹ showed that there were only 18 cases of tetanus, 54 less than last year, and the lowest number reported during the nine years the statistics have been gathered.

The most common cause of tetanus is the wound from a blank cartridge pistol, and there has been a correspondingly large decrease from 450 last year to 169 this year in the injuries due to this cause. Antitoxin was used in 7 of the 18 cases, but in no case until the symptoms had already started. The chief use of tetanus antitoxin at the present time is in the prevention of tetanus, which should be demonstrated at the time the injury is received.

Laws should be passed in every state prohibiting the use of blank cartridge pistols, and until this is done and the laws carried out, we cannot hope for the nearly complete cessation of Fourth of July tetanus.

The tables reproduced below show the distribution of tetanus as compared to previous years, and also the causes. It is curious to note that in certain States there are a large number of cases each year, Illinois, Michigan, New Jersey, Ohio, and Pennsylvania leading the list.

CAUSES OF TETANUS CASES

Year.	Blank cartridge.	Giant cracker.	Cannon.	Fire arms.	Powder, etc.	Total.
1903	363	17	5	3	27	415
1904	74	18	5	1	7	405
1905	65	17	4	5	13	104
1906	54	17	1	7	10	89
1907	52	8	6	4	3	73
1908	58	5	4	3	6	150
1909	130	9	1	4	6	150
1910	64	2	..	5	1	72
1911	15	1	1	..	1	18

Pulmonary Thrush. Notwithstanding the fact that thrush is a comparatively common infection particularly in infants, and the fact that one finds frequently growths in the trachea and larger bronchi, it is with extreme rarity that the parasite causes any very serious lesions.

Garin² has reported an interesting example of pulmonary thrush, and collected 6 cases from the literature. The first was that of Parrot, who reported it in 1870. This was in a child of thirteen days, and showed in the right apex a yellowish mass which was found to be due to the *Endomyces albicans*. In 1877 Grawitz found two cases of pulmonary thrush in diabetics, his observations being made in the pathological

¹ Journal of the American Medical Association, August 26, 1911, p. 736.

² La Semaine Médicale, May 10, 1911, p. 217.

institute of Berlin. In 1890, Schmorl reported a case in a young girl, aged ten years, who had typhoid, and who during convalescence developed a pulmonary infection which the autopsy showed to be due to thrush. There were, in this case, numerous foci scattered through the lungs which contained not only the organism of thrush, but streptococci and staphylococci as well. In 1898, Artault reported a second case in a girl, aged sixteen years, who in convalescing from typhoid developed a pulmonary infection, which, upon autopsy, also proved to be due to thrush. Garin's case was in a woman, aged forty-one years, who was taken with typhoid, and who, in a couple of months' time after the disease began, in spite of the temperature being lower, was in a very bad general condition. There were moist rales at both apices, some dulness, and it was with great difficulty that she was able to spit up very adherent sputum resembling that of pneumonia. The autopsy showed lesions suggesting the stage of hepatization of pneumonia. There were also some small cavities, and the general appearance was that of a tuberculous process. Tubercle bacilli had not been found in the sputum, and an examination of these lesions showed them to be due to the *Endomyces albicans*, with a small admixture of the *Staphylococcus albus*.

The diagnosis in a case of this kind is not liable to be made because a search for the thrush fungus would scarcely be undertaken. In cases in which it should be made the administration of potassium iodide might possibly afford relief.

Trichinosis with Symptoms Resembling Myotonia. Coriat¹ has reported a case of unusual interest. The patient, a previously healthy man, aged seventy-one years, became infected with a peculiar stiffness of the leg muscles which interfered with his ability to walk. There was a history of a severe gastro-intestinal attack some eight years before coming under observation, and shortly after the stiffness was noticed in the right leg, which was followed by weakness of the muscles in the right foot, and finally the left leg and foot were likewise affected. There was usually no difficulty in starting to walk, but after a short time, or in excessive fatigue, there arose a sensation of tightening in the calf muscles which made further walking impossible. After a short rest the contractile ability of the muscles was restored. This also occurred on riding a bicycle.

In myotonia congenita (Thomsen's disease) the rigidity takes place at the beginning of the voluntary movements, so that the case, while strikingly like Thomsen's disease, had this difference. There was a normal percentage of eosinophiles present. A piece of muscle was removed for examination, and encapsulated larvæ of the trichina were demonstrated.

¹ Boston Medical and Surgical Journal, December 29, 1910, p. 992.

Tuberculosis. THE REPORT OF THE ROYAL COMMISSION ON HUMAN AND BOVINE TUBERCULOSIS. In 1901, at the British Congress on Tuberculosis, held in London, Koch made a very remarkable statement, which was that he believed that the bovine and human tuberculosis were distinct from one another, and that the bovine disease was not a real source of danger to man. This question has been discussed, investigated, and commented upon very widely, and there are a great many differences of opinion.

Shortly after Koch's statement, King Edward appointed a commission to investigate the questions arising out of this statement. The original Commission consisted of Sir Michael Foster, chairman, Professor G. Sims Woodhead, Dr. Sidney H. C. Martin, Sir John McFadyean, the late Sir Rubert Boyce, with Dr. E. J. Steegmann as secretary. Sir Michael Foster died shortly after the completion of the second interim report in 1907, and Sir W. H. Power was appointed chairman in his place. Sir Rubert Boyce died during the publication of the final report.

The first report of the Commission was made in 1904, and this consisted of certain preliminary investigations which demonstrated that the bacilli found in the lesions of certain cases of human tuberculosis were capable of producing lesions in cattle that could not be distinguished from bovine tuberculosis. The second report, in 1907, was taken up with certain of the various forms of tuberculosis, the cultural characteristics of the human and bovine types of bacilli and their pathogenicity for various animals. In 1909 the third report was issued. This considered the conditions under which the milk from tuberculous cows was capable of causing disease. The final report contains the results of all of the work of the Commission, and also special investigations made in connection with tuberculosis in pigs, horses, and various other mammals and birds. In an appendix, which will consist of seven volumes, the details of experimental researches will be published.

The Commission was formed to inquire and report on three questions: (1) Whether the disease in animals and man is one and the same; (2) Whether animals and man can be reciprocally infected with it; (3) Under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favorable or unfavorable to such transmission.

The Commission determined that the human and bovine types of bacilli cannot be distinguished from one another by their morphology alone, but that in cultures they exhibit certain differences, and that they also differ in their disease-producing effects in various animals. The human type grows better on all the ordinary media than the bovine type, but it should be noted that the bovine type varies considerably in regard to the character of the growth. The bovine type produces a fatal tuberculosis in cattle, rabbits, chimpanzees, monkeys, goats, and

pigs. The human type of bacillus only causes a slight non-progressive lesion in cattle, goats, and pigs, but produces a fatal tuberculosis in guinea-pigs, chimpanzees, and monkeys.

Experiments made to change one type of bacillus into the other failed, the characteristics remaining permanent for both types of the bacilli. Under natural conditions, however, it would seem that at times this may take place, the reason being stated that both types of bacilli have been obtained in certain instances from the same patient. This could, however, be easily explained by presupposing a double infection.

The second question, as to whether animals and man can be reciprocally infected with tuberculosis, is answered in the affirmative. Animals of the bovine class possess a high degree of resistance to the human type of bacillus, although they are not entirely immune to it. On the other hand, the bovine type of bacillus has been found in various forms of tuberculosis in man. In most instances, the bovine bacilli were found in tuberculous diseases in childhood.

The third question, as to under what conditions the disease from animals is transmitted to man, has been studied only partially. They believe that there can be no doubt that a considerable proportion of the tuberculosis occurring during childhood is of bovine origin, particularly the forms affecting the lymph nodes and the abdominal organs, and that a certain number of cases, even in adults, are due to the bovine type of the bacillus. They urge measures to prevent the spread of the disease by the use of tuberculous milk and meat.

The investigations made by the German Government led the latter to express the opinion that the danger of acquiring tuberculosis from milk of animals affected with that disease is small.

Taking it all in all, the work of the British Commission has been most remarkable, and will do much toward clearing up certain features in connection with this question.

In this connection it is interesting to note the observations of Kossel,¹ of the Hygienic Institute of the University of Heidelberg. He studied 709 fatal cases of pulmonary tuberculosis: In 2, he found the bovine type of bacillus; in 1, a mixture of the bovine and human type; and in 705 the human type of bacillus alone. He does not believe that prophylactic measures directed toward animals will have very much effect upon the reduction of the disease in human beings.

This whole question of the relationship of the human and bovine tubercle bacillus is a very complicated one and difficult to understand. From the evidence that we have, however, it would seem that they are very closely related, that tubercle bacilli of the human type may be sometimes changed to resemble the bovine type, but that the bovine type is not as great a source of danger to the human being as the human

¹ Deutsche medicinische Wochenschrift, October 26, 1911, p. 1972.

type of bacillus. An experimental study of the changing of the characteristics of the human type of bacillus has been made by Eber.¹ This is a most elaborate study, and is reported in great detail. He inoculated guinea-pigs with material from the lungs of 7 fatal cases of human tuberculosis, and this material was then inoculated from the guinea-pig, both subcutaneously and into the peritoneal cavity of cattle. In 3 cases the bacilli recovered from the cattle that developed tuberculous lesions showed the same characteristics as the bovine type, although the bacilli from the lungs of the original source were of the human type. Attempts to change the type of bacillus by using pure cultures of the human type of bacillus grown directly from man, and then inoculated into cattle succeeded only in one instance, and this from the granulations of a tuberculous knee-joint of a child, aged nine years.

Of interest in this connection is the observation of Möllers,² who studied the sputum from 51 cases of tuberculosis. These cases were studied under exceptionally good control, and were injected into guinea-pigs and subsequently studied in cultures, and also by further inoculation experiments. In all the 51 cases the human type of tubercle bacillus was demonstrated. He also collected reports from twenty different authors, including a study of 632 cases, and in only one of these was the bovine type of bacillus found, and in this it was doubtful whether the bacillus was of the human or bovine type. Koch was of the opinion that there was no known case in which for any length of time the sputum contained bacilli of the bovine type.

INVESTIGATIONS CONCERNING TUBERCULOUS INFECTION IN CHILDHOOD. Rothe³ has reported his investigations made under the direction of the institute for infectious diseases in Berlin concerning the frequency of tuberculosis. In round numbers, about 20 per cent. of the cases had the bronchial or mesenteric lymph nodes affected. He did not find any very great amount of infection which apparently took place through the intestinal canal; on the other hand, he was inclined to believe that the most frequent route of infection was through the respiratory organs. The point of practical interest is that he is of the opinion that the danger from the bovine type of bacillus is very much overestimated, and in only one autopsy did he find a bacillus of this type.

THE EPIDEMIOLOGY OF TUBERCULOSIS. One of the last pieces of work which Koch⁴ contributed to the study of tuberculosis was the consideration of the mortality. He found that since 1886 there had been a steady diminution in the deaths from tuberculosis throughout various parts of the world in which statistics are gathered. Exceptions

¹ Centralblatt f. Bakteriologie, Originale, July, 1911, p. 193.

² Veröffentl. der Robert Koch-Stiftung, Leipzig, 1911, Heft i.

³ Deutsche medicinische Wochenschrift, February 23, 1911, p. 343.

⁴ Zeitschrift für Hygiene und Infektionskrankheiten, Band lxxvii, Heft 1.

to this are in Japan, Ireland, and Norway. In Prussia, in 1886, there were 31 deaths for each 10,000 of the population, while in 1908 there were only 16 per 10,000. The diminution was caused partly by bettering the general hygienic conditions in which the people lived, and a better knowledge of the means by which the disease is transmitted. In Ireland most of the tuberculous individuals remain at home and serve as a source of infection for others. Koch also brings out the rather interesting point that the number of deaths from tuberculosis is not greatest in the eastern parts of Germany where the people are more or less poor, but in the relatively well-to-do people living along the North Sea. He believes that much of this is due to the fact that in this region it is customary to build the beds in the wall, and these small sleeping boxes are kept closed a large part of the time, and he believes that the same habit explains the high death rate from tuberculosis in Sweden, which has a climate very favorable for the treatment of tuberculosis.

IMMUNITY IN TUBERCULOSIS. Webb and Williams,¹ with the assistance of Forster and Gilbert, have been working on the subject of immunity in tuberculosis in monkeys and children. They have already determined that large numbers of virulent tubercle bacilli may be inoculated into guinea-pigs without producing tuberculosis, provided that very few bacilli are at first inoculated, and that the numbers are increased slowly.

Lieb has shown that rabbits may be inoculated with bovine tubercle bacilli with similar results.

It is well known that monkeys (*Macacus rhesus*) are particularly liable to contract tuberculosis when kept in captivity. Their experiments were made upon 12 monkeys, all of which were first tested with old tuberculin and found to be free from tuberculosis. They started with inoculations of living virulent human bacilli, and slowly increased the number of bacilli used at each inoculation, injecting safely enough tubercle bacilli to kill at least 12,000 full-grown guinea-pigs. They have not yet ascertained the exact number of tubercle bacilli in the culture employed which will infect the Rhesus monkey. They also have vaccinated two children by the same method. These children were free from tuberculosis themselves. The father had recently died of pulmonary tuberculosis, and the mother had one lung affected. Up to the present time the children had received upward of 600 virulent tubercle bacilli without infection being produced. This is one of the links in the chain toward getting a satisfactory method of producing immunity for tuberculosis, most of which work has been carried out in America.

THE UNEQUAL REACTION OF THE PUPILS TO LIGHT AS AN EARLY SYMPTOM OF PULMONARY TUBERCULOSIS. Last year I called attention to the observations of Fodor² concerning the inequality of the pupils

¹ Journal of the American Medical Association, October 28, 1911, p. 1431.

² PROGRESSIVE MEDICINE, March, 1911, p. 211.

in early tuberculosis. The test to be of value must be made in a semi-obscure.

More recently Wolfer¹ has confirmed Fodor's observations, with the exception that he does not believe that the dilatation of the pupil is always on the side of the lesion. The explanation of this, he suggests, is that the difference in the pupil is caused by irritation of enlarged bronchial lymph nodes, and that in some instances the lymph nodes are on the side opposite to that which is affected, and hence the irregularity in the reaction.

BLOOD PRESSURE IN TUBERCULOSIS. Emerson² has made a careful study of the blood pressure in tuberculosis, and has found that hypotension, or subnormal blood pressure is uniformly found in advanced pulmonary tuberculosis, and that emaciation may play a part in its causation. It was also found in almost all cases in which the disease was moderately advanced, or in early cases in which the toxemia was marked. It should be borne in mind, however, that in the cases in which there is a gouty or arthritic diathesis, or when the patient has chronic nephritis, arteriosclerosis, or diabetes, these diseases may operate to raise the pressure to normal, or may even cause hypertension. Occasionally, the pressure may be raised just preceding a hemorrhage or during it. This may occur in a patient who ordinarily has a subnormal pressure. Subnormal pressure has been found by many observers in early, doubtful, or suspected cases, and there may or may not be physical signs of the disease in the lungs at this time. A great many clinicians regard it as a very useful sign between various conditions and tuberculosis. When persistently found in individuals or families who live under bad hygienic conditions, it should put one on his guard at least as to a predisposition to tuberculosis in these individuals.

There is great difficulty in proving a subnormal pressure, and some uniform method should be used. Emerson made all his tests in the following manner:

The patient lay in the horizontal position on an examining table, and the pulse was counted for consecutive periods until the rate ceased to vary. The systolic blood pressure (with the Janeway instrument), and the pulse rate were then taken. The patient then stood erect, and after waiting for the pulse to assume a constant rate the blood pressure and pulse were again taken. All the observations were made between three and five in the afternoon, the midday meal having been eaten between twelve and one. The hospital patients were either bed patients or those who had been resting for one or two hours immediately preceding the test. The dispensary patients had been seated in the waiting-room for an hour, and often longer, preceding the test.

Subnormal pressure, when it is present in the course of tuberculosis,

¹ Wiener medicinische Wochenschrift, March 11, 1911, p. 705.

² Archives of Internal Medicine, April, 1911, p. 441.

increases with the extension of the lesion, while the return of the pressure to normal accompanies arrest of the disease or improvement. Cured patients usually show a return to normal pressure. Emerson is inclined to believe that the prognosis can be safely based on the alteration in the blood pressure as on changes of the pulse and temperature.

In addition to his own work, Emerson has reviewed the more recent literature on the subject, and has included rather a complete bibliography.

THE BLOOD IN TUBERCULOSIS. Wright and King¹ have made a brief report of the blood in tuberculosis. They have found, as have other observers, that, in uncomplicated cases of tuberculosis, the average number of red cells is normal or above except during a short time prior to death, and that this is also true of the hemoglobin percentage which averages about 85 per cent. The total count of the white cells increases directly as the disease progresses, and they believe that frequent examinations of the blood are of great value in prognosis, serving to check up the physical and clinical findings. A high polymorphonuclear percentage they believe means a bad prognosis, and a high percentage of lymphocytes means a favorable prognosis. They believe that the other signs of improvement in any given case are decreasing total white count and a falling of the polymorphonuclear percentage. When the lymphocyte percentage is down to 10 the prognosis is bad, and when down to 6 the patient will probably die within from six to ten weeks. They have also made some observations on the hemolytic action of salt solution, and find that the red cells are pathological to the extent of resisting this, and that this resistance, as a rule, is increased directly as the progress of the disease.

THE ALBUMIN REACTION IN PULMONARY TUBERCULOSIS. In 1909, Roger and Levi-Valensi published an article upon the application of the chemical analysis of the sputum in the diagnosis of tuberculosis, and in the same year Wourmasur published a thesis on the investigations of the albumins in the expectorations, and Roger last year published an additional article.

Castellvi² has made a study of 87 cases in the general hospital at Madrid, and has arrived at the following conclusions: That albumin is found in 98 per cent. of the chemical analyses of the expectoration of tuberculous patients, in what might be called the third grade, or those who are very seriously affected, and that the albumin is found in all such cases of tuberculosis, although it may not always be constant, and so necessitates repeated examinations. He believes that the sign is of some value in diagnosis in doubtful cases, and it is interesting to note that in the cases studied, which were not tuberculous, the

¹ American Journal of the Medical Sciences, June, 1911, p. 852.

² Revista Ibero-Americana de Ciencias Médicas, January, 1911, p. 34.

reaction was absent in 97 per cent. It is occasionally noted in cases of inflammatory diseases of the lung which are not tuberculous.

It is quite possible that further study of the quantitative analysis may show something of value. Castellvi found that in these severe cases there is up to 20 grams of albumin per liter. He also made an investigation upon the nature of the albumins present, and in no case did he find serum albumin, globulin, mucin, nucleo-albumin, or alkali-albumin. Aceto-albumin was found in 6 per cent. of the cases, and was not present in the non-tuberculous cases. Propeptones were found in 11 per cent., and only in the tuberculous. Pseudo-albumin was found approximately in 90 per cent., and only in the tuberculous. As regards the pseudo-albumin, it is almost a characteristic constituent of the sputum from tuberculous cases, and Castellvi urges its use as a diagnostic method in doubtful cases.

ALBUMIN REACTION IN THE SPUTUM. Gantz and Hertz¹ have reported their observations on this subject which cover 125 cases. Their method is to clear the sputum of mucin, nucleo-albumin, food material, blood, etc., by adding 10 c.c. of sputum, 10 c.c. of distilled water, 2 c.c. of 30 per cent. acetic acid. This is thoroughly mixed, and filtered and the fluid is clear and colorless, or slightly opalescent and slightly yellowish in color. This may be tested by heat or other methods for albumin. The method which they use is simple and easily carried out, and the finding of albumin in the sputum usually means that there is either an inflammatory process or edema of the lung. In bronchial catarrh the reaction is negative, and in tuberculosis there is a more or less positive reaction, while in pneumonia, infarct of the lung and edema of the lung reaction is markedly positive. The method has not been used sufficiently long to warrant one drawing any definite conclusions concerning its value. It appears that it might be of some use in differentiating catarrhal bronchitis from tuberculous processes.

Goodman,² working in Musser's laboratory, does not believe that the presence of albumin in the sputum is of such great diagnostic importance as has been ascribed to it by Roger and his followers. As the result of his investigations, he believes that it may or may not be present in the sputum of patients suffering with pulmonary tuberculosis, and that it is frequently seen in benign affections. He believes that in the majority of cases minute extravasations of blood are the source of the protein, and these may be so small as to be invisible to the eye, and can only be found on making chemical tests.

TUBERCULOSIS AND MENSTRUATION. This subject has been studied by a number of different observers, and it was mentioned last year in *PROGRESSIVE MEDICINE*.

A very complete study had been made by Macht.³ He considers the

¹ Berliner klinische Wochenschrift, February 13, 1911, p. 285.

² Archives of Internal Medicine, August, 1911, p. 163.

³ American Journal of the Medical Sciences, December, 1910, p. 835.

influence of pulmonary tuberculosis on the menstrual function, and secondly the menstrual function on the course of pulmonary tuberculosis. His deductions were the result of studies of the histories of about 1600 cases. Classifying the patients according to the type of menstruation, he found the following:

	Percentage.
Regular menstruation, with no change noted	51.6
Amenorrhea	27.3
Irregular menstruation	8.3
Menorrhagia	4.6
Pregnant or lactating	4.4
In menopause, artificial or otherwise	3.8
	<hr/> 100.0

In this table it will be noted that over one-half the patients gave a history of no change in menstruation. The age of the patient seemed to exert a striking influence and, apparently, no matter what the duration of the disease may be, it is rare to find the menstruation suppressed in patients aged thirty-five years or over, while changes are very common in patients under the age of twenty years.

In regard to the second point considered, the *influence of menstruation on the course of tuberculosis*, it is a well known fact and has been pointed out by Mary Putnam Jacobi and others, that there are wave-like or cyclical changes in metabolism corresponding to the menstrual type of woman. At the time of menstruation, all the symptoms in tuberculous patients are markedly aggravated. Catarrhal symptoms are increased in intensity. Cough is redoubled and more distressing; expectoration is more profuse, and the sputum may be more purulent and blood-tinged. Dyspnea is more marked. There is anorexia and general malaise. Laryngeal tuberculosis takes a rapid turn for the worse. At the same time, the physical signs may be exaggerated, the whole picture resembling somewhat a sudden flare-up, very much like that following a large dose of tuberculin, and this fact should lead one to be exceedingly cautious in the administration of tuberculin at the menstrual period, a fact which has recently been brought forward by Pel. These exacerbations may be transient and subside, or they may hasten the downward course of the disease.

There are two things which are of special interest in this connection: The first, the periodic rises in temperature, and the second, the periodic hemoptyses. Changes in temperature in women who are menstruating are exceedingly common, not only in tuberculosis but also in other diseases, but it is a fairly good rule that if an individual shows a recurring fever at the menstrual period, and there is no evidence of pelvic disease, the lungs should be carefully investigated for signs of tuberculosis.

The monthly temperature curve is of some prognostic value, as in

the favorable cases the temperature grows less and may disappear altogether, while if the temperature is very high the outlook is bad.

In regard to *hemoptysis* it might be noted that there are three forms of periodic hemoptyses. Those rare instances which occur in malaria, and also the rare instances of vicarious menstruation, and lastly, the periodic hemoptysis of tuberculous patients. This phenomenon is probably more common than is generally supposed, and they may occur simultaneously with the menstrual flow or, in some instances, seem to take its place. The occurrence of periodic hemoptysis should always lead to the examination of the patient for tuberculosis of the lungs.

Kessel¹ was not able to confirm the observations made by Macht, or the other observers on the subject of premenstrual fever in pulmonary tuberculosis. He studied 100 cases in all stages of the disease, and found only 2 uncomplicated cases of premenstrual fever.

Riebold has shown, as a result of a very large series of cases, that similar rises may occur in a large number of unrelated conditions, and Kessel believes that too great a stress has been laid on the incidence of premenstrual fever in tuberculosis.

PRIMARY TUBERCULOSIS OF THE MUCOUS MEMBRANE OF THE MOUTH. Ehrhardt² has reported a rare instance of tuberculosis of the mucous membrane of the mouth and lower jaw following the extraction of a tooth. The patient was a girl, aged nine years, who had been born of healthy parents and was in good health herself. One of the front molar teeth was extracted on account of caries, and, following the extraction, did not heal. An examination proved the condition to be a tubercular process which had extended into the lymph nodes of the submaxillary regions. The diseased tissues were removed, and the patient made a rapid recovery. This case is of particular interest inasmuch as primary tuberculosis of the mucous membrane of the mouth is of very great rarity. Of course it must happen that the mouth is frequently subjected to tubercle bacilli, and yet infection practically never takes place, the bacilli which do any damage passing directly into the lymph nodes and probably in most instances through the tonsils. In 20 cases of carious teeth in children with tuberculosis of the lymph nodes of the neck, Ehrhardt was able to find only 1 in which there was an acid-fast bacillus in the teeth.

ACUTE TUBERCULOUS ENDAORTITIS. Woolley³ has reported an instance of tuberculosis of the aorta, and has reviewed the literature on the subject, and has found that the lesions may be either invasive or of a metastatic type, and that both are rare. Cases may be either acute or chronic in type, and he was able to find 10 other cases in the literature.

¹ Journal of the American Medical Association, April 29, 1911.

² Deutsche medicinische Wochenschrift, January 19, 1911, p. 124.

³ Bulletin of the Johns Hopkins Hospital, March, 1911, p. 82.

In the case reported the tubercles were the result, not of extension, but from metastases of a chronic lesion in the kidney.

PONCET'S VIEWS ON TUBERCULOSIS. Two remarkable publications¹ have been made in Paris. Alexis Thomson² has reviewed briefly the opinions expressed chiefly by Poncet, and which have been worked out in Lyons by his pupils.

Poncet's views at first strike one as being very remarkable, but the more one considers the cases and the evidence which he adduces, the more one is struck by their extreme plausibility. We have long since regarded cases of pleurisy in which the exudate was apparently sterile as of tuberculous origin; while this may not always be the case, it is reasonably true. Poncet is of the opinion, and there can be no doubt about the truth of this, that the various pathological changes in the joints can be produced by a great variety of causes. That where one meets with a joint affection, the cause of which is not plain, he believes that in most, if not all cases, tuberculosis will be found to be back of the lesion.

Charcot called attention to the frequency of a scrofulous history in the subjects of chronic rheumatism and the frequency with which they die of pulmonary tuberculosis.

Poncet calls attention to the observations of Bonnet, who was the first to note the transformation of what was supposed to be a rheumatic arthritis into tuberculosis of the knee-joint, and he also mentions the great frequency of articular rheumatism in tuberculous subjects. These troubles of the joints, which Poncet speaks of under the general term of *rheumatisme tuberculeux*, are most apt to follow tuberculosis of the lung, bronchial, or other lymphatic nodes, or the generative organs. He has never seen it follow tuberculous peritonitis or tuberculosis of the kidney. The changes brought about in the tissues he believes are caused by an attenuated virus, and they are in no way specific, there being no epithelioid or giant cells, and no bacilli. The reaction does not differ from that produced by other infections. In some instances it is merely a congestion, in others there may be a small cell infiltration, and some serous or serofibrinous exudate, and later there may be formation of adhesions and ankylosis.

Poncet employs the term inflammatory tuberculosis to distinguish it from the specific tuberculous lesion. He believes that there may be both acute and chronic forms, and that, of the latter, hallux valgus is an example, and that the atrophic variety, of which the form of polyarthritis is the best known type, also belongs in this class, that many cases of ankylosing arthritis and spondylitis deformans are of tuberculous origin, and he states that if you have a spontaneous

¹ Poncet and Leriche, *Le Rhumatisme Tuberculeux*, Paris, 1910, and Hollos, *Les Intoxications Tuberculeuses*, Paris, 1910.

² *Edinburgh Medical Journal*, December, 1910, p. 503.

ankylosis, one in which the cause is not apparent, you should suspect tuberculosis.

Among the more important clinical types, and limited space forbids me mentioning more than the most important, are the arthralgias which may move from one joint to another, and which are often seen in young people, and which are sometimes mistaken for bone disease or for "growing pains." Secondly, there is an acute or subacute form resembling acute rheumatism, in which there is a sudden onset with pain and swelling in one or more of the large joints which may last a few days or weeks and disappear without leaving any trace, or it may be followed by an inflammation of some of the other serous membranes, and sometimes terminates into a chronic joint lesion with or without ankylosis. In some instances it disappears, and the tuberculosis of some organ, as of the lungs, becomes immediately apparent. Thirdly, the various forms of what is often described as chronic rheumatism. Clinically four varieties may be met with, and these may occur alone or be present in the same individual. They are the deforming tuberculous polyarthritis, chronic polysynovitis, dry senile arthritis, and the ankylosing tuberculous rheumatism. The first is not very uncommon, and usually occurs in young people, and sometimes in children. Poncet believes that these changes not only take place in the joints, but in other tissues of the body as well. He believes that some cases of endocarditis and of pericarditis and various nervous diseases may have their origin in this same chronic poisoning. He also believes that erythema nodosum and certain other skin lesions, subcutaneous fibrous nodules, and rheumatic purpura should be placed in the same class.

MULTIPLE INFLAMMATION OF THE JOINTS FOLLOWING THE USE OF TUBERCULIN. In connection with the above, the following case reported by Diem¹ is of interest: A woman, aged thirty-two years, who had formerly had syphilis, pyelitis, and several other troubles, was given an eye test for tuberculin. This gave a positive reaction, as did also the von Pirquet test. Following this, a tuberculin injection of 0.5 milligram T. R. was given into the forearm, and the following day the temperature rose to 39° C. The right arm became swollen and reddened. The joints of the right hand were all swollen. This continued for some ten days, at the end of which time there was only a slight amount of infiltration about the seat of the injection.

TUBERCULOUS OSTEOMYELITIS RESEMBLING SCURVY. Cone² reports an interesting case of tuberculosis of the hip-joint in which there were symptoms resembling scurvy: The child, an infant, aged eighteen months, died finally of tuberculous meningitis, and at the autopsy it was found that there were large hemorrhages under the periosteum, and into the medullary cavity of the bone, both unusual in tuberculous

¹ Münchener medicinische Wochenschrift, January 31, 1911, p. 254.

² American Journal of Orthopedic Surgery, May, 1911.

processes. Another point of interest was that the child did not respond to either the von Pirquet or the Moro test. An interesting point is that the child at first improved under the use of orange juice, but other manifestations of scurvy were absent. One would be inclined to believe that a scurvy condition influenced the nature of the pathological process.

THE SITE OF A LESION IN TUBERCULOSIS OF THE LUNG. Strandgaard¹ made a study of 2432 patients of both sexes. In 390 (16 per cent.) both lungs were affected; in 1292 cases (53 per cent.) the right lung was exclusively affected or was the most involved, and in 750 cases (30 per cent.) this was true of the left lung. In a general way, the right lung is most often affected, and this is more manifest when one considers that in the unilateral affections, of which there were 633 cases, 123 (19 per cent.) were on the left side. This held good in both sexes.

THE USE OF ANTIFORMIN IN THE EXAMINATION OF SPUTUM FOR THE TUBERCLE BACILLUS. I called attention last year to the use of antiformin in the examination of sputum. In 1908 Uhlenhuth² reported his researches with antiformin, which he had used very extensively. This preparation is used by brewers in the disinfection of their fermentation vats and pipes, and depends for its action on the liberation of chlorine gas. It is composed of sodium hydroxide, 7.5 per cent., with sodium hypochlorite in such amount that 100 grams of antiformin liberates 5.3 of chlorine gas.

Boardman³ has studied the various methods suggested for the use of antiformin and, after considering the methods of Hune, Haserodt, and of Goerrez, has suggested the following as the most satisfactory, both as regards method and results:

1. Place the entire twenty-four hours' sputum in a conical settling glass; if the amount be excessive it is perhaps better to use only 15 to 20 c.c.

2. If the specimen is thick, add an equal volume of distilled water. Less tenacious specimens do not require so much dilution. Here it might be well to make sure that the distilled water harbors no acid-fast organisms.

3. Add an amount of antiformin equal to one-fourth the volume of the diluted sputum; in other words, sufficient to make a 20 per cent. solution.

4. Stir thoroughly, thereby breaking up the masses of mucus and greatly hastening complete solution.

5. Allow to stand until solution appears homogeneous. It should now be watery in consistency and pale yellow in color; if necessary, more water or more antiformin should be added, and digestion allowed to continue. This will usually require from a few minutes to an hour,

¹ Hospitalstidende, August 10, 1910.

² Berliner klinische Wochenschrift, 1908, vol. xlv, p. 1346.

³ Bulletin of the Johns Hopkins Hospital, July, 1911, p. 269.

but may be allowed to continue for days with no resulting harm to the tubercle bacilli.

6. Add an equal volume of 95 per cent. alcohol. By this procedure the specific gravity is reduced from about 1.030 to below 1.000; thereby not only hastening sedimentation, but making it more complete.

7. After stirring, allow to stand until sedimentation is complete. This will occur in two to four hours, but a period of twelve to twenty-four hours is recommended. During this sedimentation it may be necessary to gently turn the vessel to dislodge little particles of sediment which may be adhering to the sides of the vessel.

8. Pour off this clear supernatant fluid.

9. Make smear from the sediment on a glass slide, using some of the original sputum to aid in fixing the smear. This is best done by making a smear from the sputum before antiformin is added and afterward spreading the sediment from the sputum-antiformin mixture on the same slide. Stain and examine in the usual way.

SPENGLER'S DIFFERENTIAL STAINING METHODS FOR TUBERCLE BACILLI. Styles¹ has made a summary of the paper of Dr. Carl Spengler, of Davos, and reported the results of his own investigations with these methods.

Three methods may be noted. The first, called the *Farbächt* (color fast), may be distinguished from the older staining methods by the omission of acids. Sputum films are fixed in the usual way, covered with carbol-fuchsin, and heated in the usual manner. They should be stained from two to five minutes. The excess of the stain is then poured off, and the slide washed with 60 per cent. alcohol until no more color is extracted. Leave a little alcohol upon the film, and add a drop of Loeffler's methylene blue, heat quickly, wash, and dry. Staining with carbol fuchsin at room or incubator temperature has been found to be unsatisfactory.

The second method is called the *Pikrin* method. It is important that two films be used for comparison; one for the ordinary Ziehl-Nielson method and the other for the *Pikrin* method. The slide is stained with carbol fuchsin with gentle heat. The excess of stain is poured off, and picric acid-alcohol added, and left on for two or three seconds. The specimen is then washed with 60 per cent. alcohol, to which a few drops of 15 per cent. nitric acid has been added, and then with 60 per cent. alcohol, and then is stained with picric acid-alcohol until the film is acid. It is then washed and dried.

A third method is the *Hüllen* or capsule method, which is used when it is desired to demonstrate the presence of both the bovine and human bacilli, the bovine bacilli appearing very large as their capsules take the stain. This method is successful for cultures only when they have

¹ Practitioner, March, 1911, p. 420.

been subjected to no drying action. The method consists of making a thin film and allowing it to dry spontaneously, a drop of 1 per cent. of caustic potash solution is added, and allowed to dry. The specimen must not be heated. It is next stained with Loeffler's methylene blue, and washed with water, then stained with carbol fuchsin with slight warming, until vapor arises, and then washed with water, stained with methylene blue with a slight addition of 1 or 2 drops of a 15 per cent. nitric acid solution, then washed and dried.

Styles, after a careful trial of these methods, was not able to obtain a positive result in any case by the Farbäch method when the Ziehl-Nielson gave a negative one. He concluded that a pure bovine infection is rare, or that these bacilli are not in all cases decolorized by the use of acids. The Pikrin method undoubtedly in a large number of cases shows a greater number of bacilli than are rendered visible by the Ziehl-Nielson method. No marked difference in size and appearance was noted between the human and bovine bacilli as they appeared in the specimens. Neither the British Royal Commission on tuberculosis nor the German Commission have found it possible to differentiate between the human and bovine types of tuberculosis by staining methods, a point which is very important to bear in mind in reading articles upon this subject.

THE RAPID DIAGNOSIS OF TUBERCULOSIS BY INOCULATION EXPERIMENTS. Oppenheimer¹ has suggested a method of inoculating guinea-pigs by which the usual period of six weeks or thereabouts may be shortened to sixteen days, or even less. Various methods of animal experimentation have been attempted with an idea of shortening the length of time required to obtain satisfactory results. Damsch and also von Baumgarten have suggested *inoculation into the anterior chamber of the eye*, and when this experiment succeeds the tubercle in the iris may be noticed in three weeks' time. This has the objection that it requires very careful technique, and one is very liable to start up an inflammation which interferes with the experiment. Sollers and others have suggested *inoculations which would affect the lymph nodes of the inguinal region*; this results in tuberculous lesions in three weeks, and sometimes in as short a time as ten to twelve days, but it is difficult to demonstrate the tubercle bacilli in this manner, even though the glands are excised, and treated with antiformin. Oppenheimer suggests *intrahepatic injection*, using a hypodermic needle, and making three injections, one in the middle line just under the sternum, and the other two to the right and left of this. The middle and left punctures should be made $1\frac{1}{4}$ cm. deep; the one to the right may go as deep as 2 cm. This gives rather constant results within sixteen days, and if the tubercle bacilli are numerous and very virulent, miliary tuber-

¹ Münchener medicinische Wochenschrift, October 10, 1911, p. 2164.

culosis of the liver and spleen may be noted as early as five days. So far this method has been used in making the diagnosis of tuberculosis of the genito-urinary tract, injections of centrifugalized urine being used, but it is applicable to other secretions and material containing the tubercle bacillus.

DIAGNOSIS OF TUBERCULOUS MENINGITIS. Walker¹ has reported a case of tuberculous meningitis in a boy, aged nineteen years, who presented physical signs of meningitis, such as fever and leukocytosis. The fluid obtained by lumbar puncture contained 98 per cent. polymorphonuclear leukocytes and a great many tubercle bacilli. This is an important report, because most, if not all of the text-books, in speaking of the examination of spinal fluid, state that a turbid exudate containing an excess of polymorphonuclear leukocytes means a meningitis due not to the tubercle bacillus, but to some of the pyogenic cocci. As it is sometimes rather difficult to demonstrate the presence of typical bacilli in the spinal fluid, an error in diagnosis might easily occur. Cases such as Walker reports are probably exceedingly rare. It would be extremely interesting to note if there were any other bacteria associated with the tubercle bacilli. Evidently there were none found in the ordinary examinations nor from the experiments made on guinea-pigs.

MEIOSTAGMIN TEST IN INFANTILE TUBERCULOSIS. Filia² has tried this reaction with the blood serum of 36 tuberculous infants with constantly positive results. In some of the cases, the skin reactions had been negative. Twenty infants affected with various diseases were tried as controls, and all were negative. Although this method of diagnosis has not received much attention, and probably will never be suited for ordinary clinical work, it would seem to give remarkably accurate results in the hands of those qualified to use it.

THE VALUE OF RUSSO'S METHYLENE BLUE REACTION IN TUBERCULOSIS. Von Száboky³ has made a study of Russo's reaction, which was first described in *Riforma Medica* in 1905. The reaction was suggested as being simpler and easier to make than the diazo reaction, and consists of adding 4 or 5 drops of a 1 per cent. methylene blue solution to 4 or 5 c.c. of urine. After shaking these together, a positive reaction shows a greenish color, while in a negative reaction the color remains blue. Von Száboky came to the conclusion that the diagnostic value of Russo's reaction in pulmonary tuberculosis was insignificant, and that the constant presence of the reaction in pulmonary tuberculosis had the same significance as the constant presence of the diazo reaction, which is that it means a bad prognosis. The persistence of a negative reaction or of a reaction that is transiently present does not permit one to draw any conclusions of value. He regards the reaction

¹ Boston Medical and Surgical Journal, June 8, 1911, p. 816.

² Il Policlinico, 1910, No. 44.

³ Zeitschrift für Tuberkulose, April, 1911, vol. xvii, Heft 3, p. 261.

as of nearly the same value as the diazo reaction, and it can be made more easily and more quickly.

THE CUTANEOUS AND CONJUNCTIVAL TUBERCULIN TESTS IN THE DIAGNOSIS OF PULMONARY TUBERCULOSIS. Hamman and Wolman¹ have published a second report dealing with tests made on 1000 additional patients who formed the unselected material and ambulant clinic at the Phipps Dispensary of the Johns Hopkins Hospital. They used the same technique as that used in their first report,² which included 500 cases.

For the conjunctival tests, one drop of a 1 per cent. solution of Koch's old tuberculin (human) was instilled into the left eye, and in the event of no reaction, 1 drop of a 5 per cent. solution was used in the right eye. If no reaction was produced further instillations were not used, owing to the fear of a possible intense reaction. Their fear was based on evidence gathered accidentally, that a second instillation may give a positive and even a severe reaction in a case in which a previous similar test gave a negative result.

For the skin test a superficial incision is made into the skin of the forearm, through a drop of old tuberculin, and a control incision made at the same time through the untreated skin.

They divided their cases into six groups without reference to the result of the tests. These were based on clinical study: Non-tuberculous, doubtful, probable, incipient, moderately advanced, and far-advanced. They obtained essentially the same results as in their report in 1909. The skin test is well established in the sense that only patients who have at some time been infected by tubercle bacilli can react, and this test shows that a large number of healthy people have been so infected. But, as the test remains positive even when the infection has been successfully overcome, the test is only of value when the patient is in the first year or two of life. A negative test is not absolute proof, as there is always a possibility of a fault in technique.

The conjunctival test, as ordinarily employed, is not so sensitive, and if a test is positive, and there are suspicious symptoms or signs, such a result is strong presumptive evidence of the existence of an active lesion. They do not believe that a patient apparently well should be committed to treatment solely because he reacts to a 1 per cent. eye test, but they do believe that such an individual should be under medical observation for a considerable period of time.

THE PROGNOSTIC VALUE OF ARNETH'S METHOD OF BLOOD COUNTING IN PULMONARY TUBERCULOSIS. In 1904 and 1905, Arneth, working in von Leube's clinic, suggested a method of counting the blood which would seem to be of considerable value in making the prognosis in

¹ Archives of Internal Medicine, December, 1910, p. 690.

² PROGRESSIVE MEDICINE, March, 1910, p. 168; Archives of Internal Medicine, May, 1909, p. 307.

tuberculosis, and very probably in some of the other infectious diseases. This method has not attracted the attention which it would seem to warrant, although studies have been made in this country by Klebs and Bushnell. The method is that of counting the number of nuclei in all the neutrophilic leukocytes, and dividing them into five classes according to the number of their nuclei, placing these in a horizontal row beginning on the left with Class I, which contains one nucleus, and ending on the right with Class V, which contains five nuclei, what might be said to be the normal neutrophilic blood picture is obtained. Arneth states this to be as follows:

I	II	III	IV	V
5 per cent.	35 per cent.	41 per cent.	17 per cent.	2 per cent.

In studying the blood in pulmonary tuberculosis a difference in the picture is seen, consisting of a movement (*Verschiebung*) to the left, as in the following case of miliary tuberculosis:

I	II	III	IV	V
36 per cent.	56 per cent.	8 per cent.	0 per cent.	0 per cent.

And, again, in the case of subacute tuberculosis:

I	II	III	IV	V
45 per cent.	52 per cent.	3 per cent.	0 per cent.	0 per cent.

He believes that the young white cells, or those with one or two nuclei, are less resistant and less able to combat an infection than the older ones with more nuclei, and it is the opinion of the observers who have studied this subject that the drift is a proof that toxic absorption is present in a degree which constitutes attacks on the resistance of the patient.

Minor and Ringer¹ have studied this subject, and have found that with great but not complete uniformity favorable cases show a picture tending toward the right, and unfavorable one tending toward the left, very much in proportion to the severity of the cases and its outlook for a cure. In very bad cases where the prognosis of course could be made on other clinical grounds, the picture is uniformly very bad. In the less advanced cases, however, the method often gives great assistance, and throws unexpected light upon the future course, which frequently helps in outlining the treatment. Examinations during the course of a case, if not too close together, will generally show a drift to the right or to the left, according as the case is doing well or ill.

The technique of the count is exceedingly simple. Smears are lightly made, as for ordinary counting, and stained by whatever method the

¹ American Journal of the Medical Sciences, May, 1911, p. 638.

observer prefers, Jenner's being perhaps the most suitable, and the thinner portions of the smears are to be preferred. It is well to use a mechanical stage to avoid counting the same cells twice. Some little difficulty is experienced in separating the nuclei into the various classes, and the nature of the rule used for determining this perhaps is of less importance than is the fact that some very definite rule should be made by each observer. Minor and Ring suggest the following:

1. Nuclei connected by a distinct isthmus are always to be counted as one nucleus.

2. Nuclei connected only by a thread are always to be considered as two nuclei.

3. Nuclei clearly superimposed are to be considered as separate nuclei, but if the superposition is not definite the nuclei are not to be considered as being separate.

It seems rather remarkable that this clinical method has not attracted more attention, and it is to be hoped that observations will be made upon the blood picture in other diseases.

Etienne,¹ of Nancy, has made a study of Arneth's method of counting the white blood cells in its relationship to the tuberculosis cure, and was able to confirm the observations as above noted.

TUBERCULOSIS AND SARCOMA. Simonds² has reviewed the literature upon this subject and reported one case, together with the autopsy findings.

The association of malignant growths and tuberculosis is certainly by no means common. Rokitsansky, in 1846, declared that tuberculosis and carcinoma are very infrequently found in the same patient. This question was disputed, and a few years later Lebert found 15 cases of tuberculosis among 173 cases of carcinoma, and he believed that a patient with cancer could contract tuberculosis as well as anyone else, but considered the occurrence of carcinoma in the progress of tuberculosis rare. The literature upon this subject is quite abundant. The association of sarcoma with active tuberculosis seemed to have been observed very much less frequently, and an examination of the post-mortem records of about 2500 cases of sarcoma of various organs collected from the literature yielded 19, which showed this combination.

The cases found in the literature may be grouped in three classes. (1) The tumor and tuberculosis are primary in the same organ in which the processes may be either separate or intermingled. (2) Sarcoma and tuberculosis are primary in adjacent organs, and the tumor may or may not grow into the one with tuberculosis. In the third group, the lesions are primary in remote organs, and there may or may not be sarcoma metastases in the tuberculous organ.

¹ Société des Biologies, March 25, 1911.

² Bulletin of the Johns Hopkins Hospital, January, 1911, p. 17.

ON THE TREATMENT OF TUBERCULOUS PERITONITIS. Duran and Serra y Bennasar¹ have an interesting communication detailing their experience with an easy and apparently efficacious treatment of tuberculous peritonitis. There have been a considerable number of contributions made upon this subject, and the opinion most prevalent is that the best method of treatment is to do a laparotomy. Following the exposure of the peritoneum to the air a change frequently takes place; the inflammation which was accompanied by an effusion becomes converted into a dry process, and apparently subsequently disappears or becomes quiescent. There are some twenty different theories why this takes place, none of which need be gone into at the present time. The authors just mentioned suggest in place of this procedure an operation which has been suggested, and in fact, practised, in nearly the same manner by Mosetig-Morhoff, of Vienna, and Nollen, of Leyden. The procedure is as follows: Ordinary paracentesis is done, and as much of the effusion evacuated as possible; a rubber tube is then attached to the trocar, and this tube is connected with an ordinary bottle, the stopper of which is pierced by two glass tubes, one of which reaches nearly to the bottom, and the other passing just inside the cork; the rubber tube is attached to the shortest of these, the other glass tube being connected with an ordinary air pump; the lower two-thirds of the bottle is filled with small pieces of caustic potash, and the remainder with aseptic cotton. The air pumped through this simple apparatus becomes perfectly dry, as all the moisture is absorbed by the potash, and all the dust and germs are filtered out by the layer of cotton. As much air as can easily be pumped into the peritoneal cavity is injected, and then this is brought in contact with as much of the serous membrane as possible by gentle percussion and movements made with the palm of the hand on the abdomen. After this has been done most of the air which has been pumped in is allowed to escape. The trocar is then removed and the wound sealed with an ordinary aseptic dressing. The results obtained by this method are similar to those obtained by laparotomy, and the advantage is that the procedure is a minor operation, easily performed, and requiring no special skill.

Typhoid Fever. ANTITYPHOID INOCULATION. The history of anti-typhoid inoculation dates back among the earliest of the immunizing experiments, and, following Pasteur's work on immunity in anthrax, several investigations were undertaken on laboratory animals.

In 1886, Fraenkel and Simonds found that rabbits could be protected by small doses of typhoid bacilli, and in the same year, Beumer and Peiper succeeded in producing immunity in mice. Similar experiments were made by Chantemesse, Widal, and Sanarelli. In 1892 it was shown by Brieger, Kitasato, and Wassermann, that killed cultures

¹ La Clinica Moderna, November, 1911, p. 628.

were as effective in producing immunity as were live ones. In 1893 and 1894, Pfeiffer, together with Wassermann, Kolle, and Isaëff, made other studies on immunity in cholera and typhoid, and formulated the classic Pfeiffer phenomenon. Pfeiffer and Kolle, in 1896, made the first experiments on men, and Wright made some experiments in the same year. In 1898 Wright introduced the method into the British Army, to whom belongs the credit for starting it in human beings.

The most valuable contributions toward the practical application of this method were made in 1904, and since by Leishmann and his students, and their method may now be said to be well worked out, as will be seen by a study of the following articles:

The use of antityphoid vaccine may be said then to have passed through the experimental stage, and become an established prophylactic measure. Information concerning it has been so widespread, both through medical journals and the lay press, that an extensive notice of it is not needed at this time. One of the notable reports on this subject is that made by the commission appointed by the Academy of Medicine at Paris, published in the *Bulletin of the International Office of Public Hygiene*, April, 1911. This has been published in extracts in the *Public Health Reports*.¹ This report contains a considerable amount of data on the subject which may be passed over, the particular interest centring in the summary of the results obtained. The form of vaccine most frequently employed is that derived from cultures of the typhoid bacillus killed by heat. Antityphoid vaccines have been used for several years in the English, German, and American armies, and more than 100,000 persons have been inoculated, either in their native countries, or in colonies where these soldiers have been sent where typhoid fever is prevalent. Vaccination not only reduces the incidence of typhoid fever, but also reduces the mortality should the vaccinated individual subsequently take the disease. The period of immunity seems to vary between one and four years.

Persons who may be designated as specially liable to be benefited by antityphoid vaccination are the following: (a) Physicians, internes, medical students, male and female nurses in military and civil hospitals; (b) members of families in which bacillus carriers have been demonstrated; (c) young persons of both sexes who come from healthful regions in the country to cities which are habitual foci of typhoid fever; (d) the population of cities where the disease is frequent; (e) soldiers and sailors.

The French commission concluded with a recommendation for the voluntary employment of antityphoid vaccination as a rational and practical method of diminishing the frequency and gravity of typhoid fever in France and in the French colonies.

¹ Public Health Reports, October 6, 1911, p. 1508.

Perhaps the most striking demonstration of the value of this method is the experience of the manoeuvre division of the United States army in Texas. About one-quarter of the troops that arrived at San Antonio had already been immunized by voluntary inoculation. It was decided, however, to make the procedure compulsory, and this was carried out as rapidly as possible. The result was that in 12,801 men there was only one case of typhoid fever, and no death. The patient who developed typhoid had not completed his immunization, having taken only two doses, and the case was one of extreme mildness, and would have probably been overlooked but for the rule that blood cultures were made of all fevers of over forty-eight hours' duration. In addition, there was a civilian teamster who was not immunized and was admitted to the hospital, suffering from typhoid. When one compares these figures with the reports in the Spanish-American war, one notes a striking difference. In 1898 the second division of the seventh army corps, which assembled at Jacksonville, consisted of 10,759; there were 1729 certain cases of typhoid, and counting in with these the probable cases, there were 2693. In these there were 248 deaths, and the total deaths from all diseases were 281. In 1911, in a slightly larger division, there were only 11 deaths from all diseases, and none from typhoid.¹

Fox² has contributed a brief paper relating to this subject, in which he calls attention to the fact that a number of improvements have been introduced in the technique; first, in the determination of the best strains of typhoid bacteria to employ and their degree of virulence. The possibility of combining with this the paratyphoid bacillus has also been under consideration. The cultures which are used should not be too old, in fact, not more than forty-eight hours old, and the sterilization is best effected by heat at a temperature of 53° C., as it has been found that a small increase over this temperature lowers the protective power of the vaccine, and this probably explains the irregular results of the earlier experiments. The vaccines are also more carefully tested for their sterility, and 0.4 per cent. of lysol is added after the vaccine has been allowed to cool. Improved methods of counting bacteria have made the standardization of the vaccine more certain.

As regards the age of the vaccine when used, it has been found that to obtain the best effects it should be employed not less than three weeks, and not more than three months after its preparation. If used earlier the reactions are severe, and after three months the vaccine becomes less active.

The dose is smaller than at first suggested. It is found that 500,000,000 and 1,000,000,000 of bacteria respectively, for the first two inoculations, given at ten day intervals seem quite adequate. A third

¹ Keen, *Journal of the American Medical Association*, August 26, 1911, p. 713.

² *Journal of Tropical Medicine and Hygiene*, December 15, 1910, p. 367; Russell, *New York State Journal of Medicine*, December, 1910, p. 535.

inoculation of 1,000,000,000 is sometimes given, and probably produces a longer period of immunity. The injections are usually made in the region of the insertion of the deltoid or the loose tissues below the clavicle, the fluid being introduced into the subcutaneous tissue, and not into the muscles. In this connection I might state that a site for injections of vaccines, serums, and the like, which is not generally used but which is certainly the best site, is the loose connective-tissue of the abdomen. Injections may be made at this point with less pain and produce less subsequent discomfort than in any other part of the body. Reactions which follow this dosage are, as a rule, more or less trivial and only temporary, and at the end of forty-eight hours they have all disappeared. There is a general reaction and slight fever, seldom exceeding 101° F., and this lasts from twenty-four to thirty-six hours. Alcohol taken after the inoculation is said to increase both the local and general signs.

Attempts to administer the vaccines by mouth have not been satisfactory so far. The digestion is usually more or less disturbed, and the effect upon the protective substances of the blood irregular.

As regards the dosage for women and children, it may be stated that a healthy woman may receive as large a dose as a man, and if she is delicate, three-fourths only may be given. If the woman is pregnant, the general practice is to put off the inoculation.

Fox thinks that children aged under seven years need not be treated. This seems to me to be a mistake. I am of the opinion that the disease in children is much more common than is ordinarily supposed, and, owing to the fact that it often occurs in a mild form, it passes unrecognized, and serves as a source of infecting other individuals. Fox recommends one-fourth of a dose for children aged from seven to twelve years, one-half of a dose from twelve to fifteen years, and three-fourths from fifteen to seventeen years, while above seventeen the dose is the same as for adults. Rest should be enjoined following an inoculation, particularly in hot weather and in warm climates.

The immunity lasts on an average of about two years, although in some instances it undoubtedly lasts longer. Reinoculation is advised every two years, a single dose containing 1,000,000,000 bacteria being all that is sufficient.

In regard to failures to obtain protection, it is important to study the character of the vaccine used: First, whether it is obtained from a reliable source, whether it was standardized, and whether it was of proper age.

The use of vaccination is extending rapidly in the British Army. It is still a voluntary measure, but more than three-fifths of the 70,000 British troops in India are at present inoculated. The colonial troops of the German Army have been vaccinated, and, in accordance with reports, the case-incidence of typhoid has been reduced by one-half,

and the case-mortality by one-half, thus diminishing the total mortality one-fourth.

In France there has been a provision of 15,000 francs made by the Minister of War in 1911 for antityphoid vaccination, and at the meeting of the Academy of Medicine in Paris, February 28, 1911, the following report of Vincent was adopted.

They recommend the employment of the antityphoid vaccine as a rational and practical means to diminish the very marked proportions and gravity of typhoid fever in France and the colonies. This recommendation is made to all those who by their profession or their usual or accidental habits of life are exposed wholly or frequently to patients with the disease or to typhoid carriers.

Richardson and Spooner¹ have suggested the inoculation of nurses in training schools, owing to the fact that they found that typhoid was exceedingly common in these institutions. This is a point which might well be taken up throughout the country, as it has been pretty definitely established that typhoid inoculation reduces not only the morbidity, but the mortality in this disease, and it is a notorious fact that nurses and internes are frequently infected.

ANTITYPHOID VACCINATION BY MEANS OF THE GASTRO-INTESTINAL TRACT. Courmant and Rochaix² have carried on a series of experiments upon goats, guinea-pigs, and rabbits, and also upon man. They used a culture eight days old which had been killed at 53° C. They came to the conclusion that it was possible to obtain satisfactory results by this method, and it may be applied without any discomfort on the part of the individual. This is a method which would need to be studied very much farther before adopting it in place of the method now in use, which has given such good results.

A QUICK MACROSCOPIC AGGLOUTINATION TEST. Bass and Watkins³ have proposed a method of making the typhoid agglutination test in a manner which is wonderfully simple and, if it bears out their claims, will place this valuable test within the possibilities of every practising physician.

All that is needed is an ordinary microscope slide or other piece of glass, a surgical or some other puncture needle, and an ordinary medicine dropper. A suspension of dead typhoid bacilli is used in the strength of 10,000,000,000 typhoid bacilli per cubic centimeter in 1.7 per cent. sodium chloride solution, to which 1 per cent. of liquor formaldehydi is added. This can be readily prepared by anyone familiar with the making of standardized bacterial suspensions. It is a stable test solution, and may be marketed without difficulty.

By using their method the relation of each bacillus to the amount of

¹ Boston Medical and Surgical Journal, January 5, 1911, p. 9.

² Académie des Sciences, March 20, 1911.

³ Archives of Internal Medicine, December, 1910, p. 717.

serum used is about the same as that used in the ordinary Widal reaction, and they purposely made it conform to the ordinary standard requirements, although they believe that there is good reason for increasing the quantity of blood per bacillus in all agglutination tests, but they hesitate to change a well-established standard.

The test is made by diluting the blood with four times its volume of water. One or two drops of this diluted blood is placed on a microscope slide with an equal quantity of the test fluid, and the slide is tilted from side to side, or from end to end so as to keep the mixture flowing back and forth. If the reaction is positive, a grayish, mealy sediment appears within one minute, usually within less than that time. This consists of agglutinating bacilli, and is seen with the unaided eye. It appears in the fluid around the edges first and tends to collect there. If the agitation is continued, the clumps increase in size for two or three minutes. In the blood that gives a weak reaction the appearance of the sediment is not as rapid as with the stronger reacting blood. It is useless to continue the test longer than two minutes, for if the reaction has not occurred in two minutes, it will not occur at all. When the reaction is negative no agglutination occurs, and the mixture remains as clear and unchanged as when placed on the slide.

When they first started to make the test, they put one drop of blood in a small bottle containing four drops of water. Recently they have improved on this, although possibly at a slight sacrifice of accuracy, by spreading approximately one-fourth of a drop of blood on a slide and dissolving this with a drop of water. This one-fourth of a drop of blood is about the quantity used for making blood slides in examinations for malaria, differential counts, etc. The drop of water should be spread over the blood with a clean tooth-pick or match-stick. As soon as the blood is dissolved, which it will be in less than one minute, one drop of the test fluid is added, the mixture agitated, and the reaction noted. The specimen may be examined at the bedside or carried away and examined at some convenient time. Specimens of dried blood may be diluted with approximately four times their volume of water, and any undissolved particles in the solution should be allowed to settle to the bottom. These or dust particles or *débris* from an unclean slide, dropper, or water, may be mistaken for a positive reaction by those not familiar with the test.

In passing, it might be noted that Bass has suggested a very convenient needle for the puncture, consisting of a surgical needle thrust into a cork which fits into a small bottle in which may be kept a small quantity of alcohol. This is inexpensive, easily made, conveniently transported, and always sterile.¹

The advantages of the Bass and Watkins over the usual method are

¹ Bass, *Medical Record*, 1910, vol. xxviii, p. 538.

that it requires only two minutes instead of an hour to make the test. It is not necessary to have any laboratory experience, microscope, or other laboratory facilities. The expense of each test should not exceed one-half of one cent, whereas the usual charges for agglutination tests made in the laboratories are from one to five dollars. Tests can be made every day without sacrifice of time or money until the case is diagnosed. Tests can be made at the bedside when the information it will furnish is most desired.

They have used this test for over a year along with the ordinary Widal, and believe it to be just as reliable. They also call attention to the fact that the same principles and technique can very probably be applied to other diseases in which specific agglutinins are formed by substituting the appropriate bacteria for typhoid bacilli. Different strains of typhoid bacilli and the paratyphoid have been tried successfully.

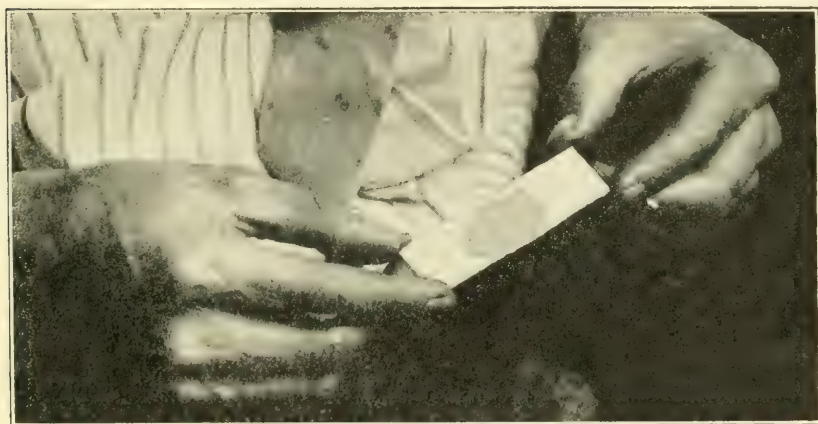


FIG. 4.—Method of holding the slide while rocking it to hasten agglutination and also proper position of slide for the reaction to be best seen.

My own experience with this test has been rather limited, but, thanks to Dr. Bass for sending me the necessary suspension, I have been able to try it. In infants and children it seems to give trustworthy results. In all cases of typhoid it has been positive, and in all other diseases negative. I have not, however, had occasion to try it in persons who give the ordinary Widal after an attack of typhoid several years previous (Figs. 4, 5, 6, and 7).

MANCHURIAN TYPHOID. Botkin and Simnitzki¹ have made a report upon a disease which they and others observed during the Russo-Japanese War in 1904, which, while it had some points in common with

¹ *Zeitschrift für klinische Medicine*, 1911, vol. lxxii, Heft 3-4, p. 271.

the typhoid group, was evidently caused by an entirely separate bacillus, for which they have suggested the name of Manchurian typhoid.

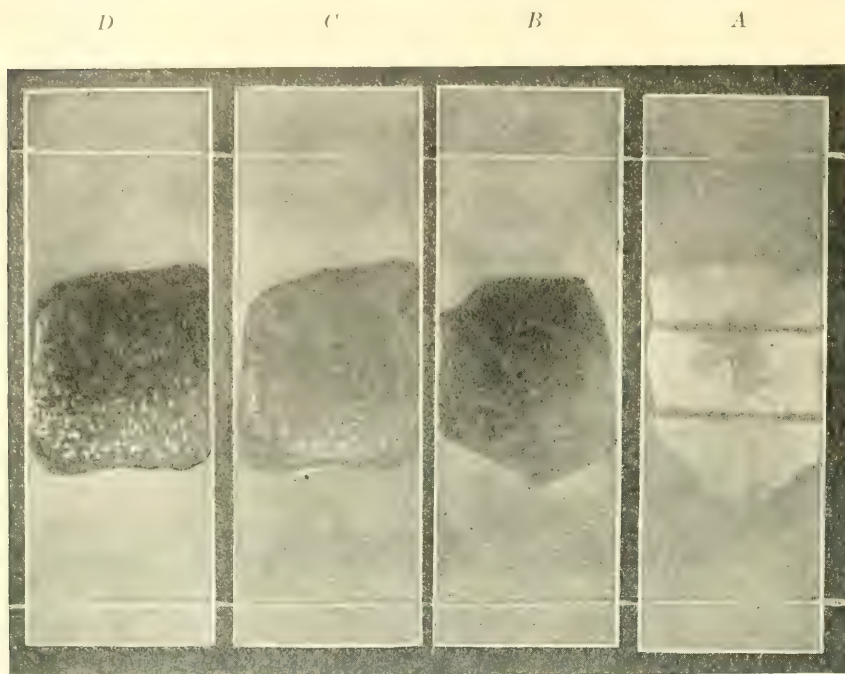


FIG. 5.—Proper blood specimen and reactions in typhoid agglutination test: A, a good spread of blood for the test. B, negative. C, weak positive. D, very strong positive.

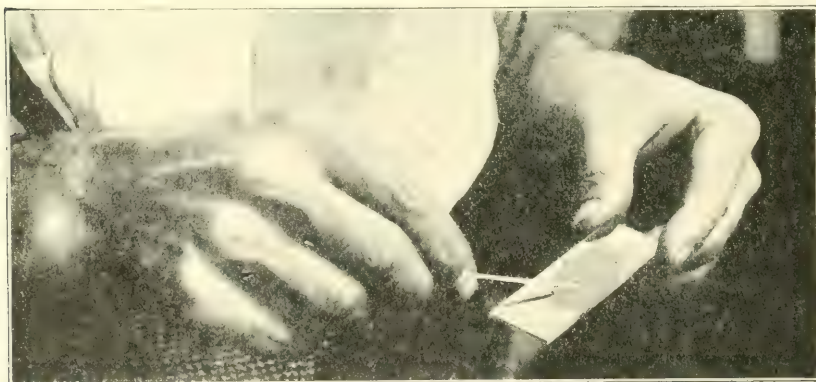


FIG. 6.—Method of holding the slide and spreading the drop of water over the spread of blood on the slide to dissolve it.

Barykin made a study of the paratyphoid disease in the Manchurian army, and published his monograph in 1906. He found in 800 cases of

typhoid-like conditions, in which the bacteriological investigations were made, that there were 75 cases of infection with paratyphoid B., 11 cases with paratyphoid A., 6 cases with the colon bacillus, in 13 cases a mixed infection with the typhoid and paratyphoid B., and in 2 cases a mixed infection of typhoid and paratyphoid A.

The clinical picture of Manchurian typhoid is more or less the same, and when first observed was thought to be typhus. The most important feature of the disease was that it began with a chill which usually came on rather suddenly, and sometimes there was a repetition of the chill followed by fever and sometimes vomiting. There were headache,

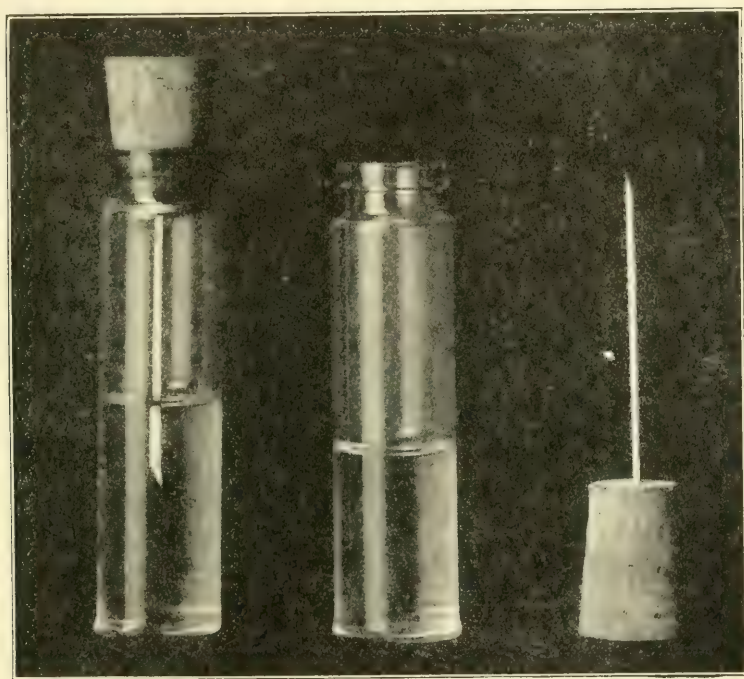


FIG. 7.—Bass' blood sticker.

pain in the legs, and, indeed, all over the body. The temperature rapidly reached 39° to 40° C., although sometimes several days passed before this point was reached. After this the temperature was more or less of a continuous character, with trifling changes of about 1° C. In from nine to fifteen days there was a fall to normal either by crisis or lysis. In the latter case the morning temperature was higher than the evening temperature until the normal was reached. A very characteristic feature was the eruption of small roseola and petechial spots usually coming on rather suddenly in the third or fourth day of the disease, and spread over the entire body, although there was a tendency

for it to be more upon the flexor surfaces of the limbs. Sometimes the eruption was somewhat papular in character. It soon faded, and usually disappeared two or three days before the fall of temperature. In some cases there was constipation, and in other cases diarrhea and very often meteorismus. The spleen was enlarged and palpable, and the liver usually enlarged. There was loss of appetite, dry mouth, coated tongue, usually some bronchitis, and in some cases bronchial pneumonia. In most cases the mental condition was very much like typhoid, and occasionally there was delirium. There was dilatation of the heart in some cases with systolic murmurs, and usually a rapid pulse. In the cases in which blood examinations were made there was no special change from normal. There was often albuminuria and marked polyuria coming on with convalescence. The disease showed a tendency to be epidemic in certain regiments.

By means of blood cultures typhoid-like bacillus was isolated which gave a marked agglutinating reaction with the blood of patients diluted to as much as 1 to 1000 or to 1 to 2000, and in concentrated solutions of from 1 to 10, 1 to 20, 1 to 30, and 1 to 40 the blood caused agglutination of the typhoid, the paratyphoid A. and B., and the colon bacillus. The blood also gave a marked hemolytic reaction which was slight with the bacilli of the above-mentioned diseases, and very marked with the bacilli of the Manchurian typhoid cases. This disease apparently is another one of the typhoid group which is closely related, and yet evidently has a distinct germ as the cause. The pathological changes found on autopsy are chiefly hyperemia of the mucous membrane of the lower part of the small intestine, swelling of the Peyer's patches and of the mesenteric lymph nodes, and in some cases a tendency to ulceration of the bowel.

TYPHOID SPINE. McCrae¹ reports 2 additional cases of typhoid spine with bony changes in the vertebræ. Other observers have reported the same thing, although McCrae² was the first to report bony changes that have been shown by skiagrams.

Formerly the term typhoid spine was applied to a symptom complex regarded by many as being a neurosis in a majority of cases, and it is quite possible that some cases may be a neurosis, although recent observations upon the organic changes which occur in typhoid spine are against this view. The changes that are noted are local swelling, and sometimes redness, together with tenderness over the spine and sometimes in the adjacent muscles. Rigidity of the spine is almost invariably present. Kyphosis is noted in a certain number of cases, and scoliosis in others. There are evidences of involvement of the nerve roots, as sensory disturbances are common, and changes in the reflexes occur in a large proportion of cases. In some instances there

¹ Bulletin of the Johns Hopkins Hospital, March, 1911, p. 75.

² American Journal of the Medical Sciences, 1906, vol. cxxxii, p. 878.

has been atrophy of the muscles of the legs. In some instances suppuration has occurred, and on examination with the x-rays changes have been noted in the spine.

Typhoid spine may be regarded as a spondylitis or perispondylitis with definite local changes, which sometimes lead to the formation of new bone, and so result in fixation of the spine. These permanent changes are less likely to occur if proper treatment is instituted early, although many cases of spondylitis clear up without leaving any permanent result.

McCrae suggests the use of antityphoid inoculation, the dosage being the same as that employed in antityphoid vaccination. Counter-irritation, especially the Paquelin cautery, may give relief, and hydrotherapy may also be useful. The application of a plaster jacket or some other means of fixation of the spine usually affords great relief.

INTESTINAL PERFORATION IN TYPHOID FEVER. Bagley¹ states that in 1903 Harte and Ashhurst published a complete tabulation of all cases of operation for typhoid perforation from 1884, the date of the first operation by Mikulicz. Bagley has reviewed the literature from October, 1903, until December 31, 1909, and the results of his investigation, while extremely interesting, add very little to our present knowledge either in regard to the diagnosis or treatment. One important point to which he calls special attention, is the almost universal mistake made by the surgeon and the internist to describe fully the symptoms of peritonitis for those of perforation.

ABSCCESS OF THE LIVER IN TYPHOID FEVER. Von Eberts² has made a study of the question of abscess of the liver occurring in association with or following typhoid fever. The fact that there could be suppuration in the liver during the course of typhoid fever has been recognized since the time of Louis, and the abscess may be either multiple or solitary. His studies were based upon the reports of 30 cases occurring in patients varying between five and forty-three years of age. The solitary abscess was generally the sequel of a mild type of infection. Abscess of the liver may arise independently of typhoid lesions of the gall-bladder or ducts, pyelephlebitis, or the presence of suppuration elsewhere in the body. These abscesses bear no relation to age or sex apart from their relation to typhoid fever generally. The most important factors predisposing to suppuration are the virulence of the primary infection, traumatism, and preëxisting disease, and the great frequency of liver abscess in relation to typhoid fever reported from hot climates may be accounted for, first by the high incidence of typhoid in European drafts, and by the preëxistence or the occurrence during convalescence of amebic infection. The abscess may occur early in the course of the primary infection after a fever-free interval of a few days or weeks, or

¹ Surgery, Gynecology, and Obstetrics, August, 1911, p. 191.

² American Journal of the Medical Sciences, June, 1911, p. 803.

as a remote sequel. The most characteristic symptoms of the onset are enlargement of the liver, fever, local pain, and tenderness. Jaundice is present in only about 15 per cent. of the cases. In about one-half the cases the suppuration is located in the right lobe. The occurrence of chills apparently bears no relation to the character of the organism found in the local lesion, but it would also appear that sometimes the foci of suppuration in the liver due to the typhoid bacillus may undergo spontaneous resolution. There is not infrequently either a serous or a purulent pleuritis. The recognition of solitary abscess is important, as only such cases are suitable for surgical treatment which consist of incision and drainage, the route selected depending upon the location of the abscess. Preliminary transperitoneal puncture should not be practiced, owing to the danger of leakage and peritonitis.

PERFORATION OF THE GALL-BLADDER IN TYPHOID. Armstrong¹ reports an interesting case in a girl, aged ten years, who, in the third week of a typhoid of moderate severity, and after the temperature had been normal for three days, complained of pain in the right hypochondrium. On the following day an ovoid swelling appeared in the situation of the gall-bladder. This felt as large as a turkey's egg, was very tender, and moved up and down during respiration. It was accompanied by a rise of temperature and rapid pulse. There was no jaundice. On the fourth day of the tumor, another accession of pain led to operative interference, when an abscess was found, in the middle of which was the gall-bladder perforated in three places. The walls were everywhere necrotic, but there were no stones. The child made an uneventful recovery after a cholecystectomy was performed.

TYPHOID FEVER AND ACUTE APPENDICITIS. Hesse² has reviewed the literature and reported some instances of the association of typhoid fever and appendicitis. He groups these cases under three headings: (1) Typhoid fever complicated with acute appendicitis, or vice versa; (2) an inflammation of the appendix as the direct consequence of the typhoid disease, or what might be called typhoid appendicitis; and (3) a post-typhoid disease of the appendix with stenosis or kinking of the appendix due to ulceration.

Anyone interested will find a full list of references to the literature in this article, and perhaps the chief point of interest is the fact that the diagnosis in all of these is practically impossible.

EXPERIMENTAL TYPHOID. Metchnikoff and Besredka³ have made a study of experimental typhoid and have shown that it is possible to produce the disease experimentally, but that only the anthropoid apes are sufficiently sensitive to be infected by the administration of typhoid

¹ Montreal Medical Journal, December, 1910, p. 805.

² Mitteilungen aus den Grenzgebieten der Medizin und Chirurgie, 1911, vol. xxii, Heft 5, p. 771.

³ Annales de l'Institut Pasteur, March, 1911, p. 193.

virus by the mouth. It is not possible to infect the lower monkeys by means of the injections of the typhoid virus except under exceptional circumstances, and the rodents are refractory to the typhoid. The typhoid virus is in the typhoid bacilli, and pure cultures of these may be used in producing the disease in anthropoid apes. They do not believe that the virus is filterable. They believe that the methods of vaccination of dead macerated bacilli which are capable of protecting the guinea-pig against peritoneal infection are insufficient in experimental typhoid. They state that experimental peritonitis of rodents caused by the injection of the typhoid bacilli should not be confused with the typhoid fever produced by the ingestion of the virus by the mouth. They are not very favorably inclined to the present methods of antityphoid vaccination as practised in the various armies, and believe that other methods will be found which will confer greater degrees of immunity than those at present in use.

TYPHOID BACILLI IN THE CEREBROSPINAL FLUID. Stühmer¹ has reported an instance of a case of typhoid in which meningitis symptoms supervened, and persisted, and in which a lumbar puncture was done. The fluid under considerable pressure was slightly cloudy, and on centrifugalizing it a yellowish-white sediment was collected. An examination of this showed the typhoid bacilli. The patient became better after the puncture, and subsequently made a good recovery. An interesting point about the case is that the patient did not show any of the more characteristic symptoms of typhoid. There was no disturbance of the intestinal tract, the stools during the entire illness were normal. There was no swelling of the spleen, no eruption, and no typhoid edema. The typhoid bacillus was found a few times by lumbar puncture, but probably in ordinary typhoid, if it were looked for, it might be found oftener. Cases of typhoid meningitis in which the organisms have been demonstrated in the cerebrospinal fluid are of comparative rarity. It would be exceedingly interesting to have a series of observations made on the typhoid cases which show marked mental disturbance, particularly when coupled with slight symptoms of meningitis.

David and Speik² have reported on the findings in the cerebrospinal fluid in 12 patients with typhoid fever, and they found that the cultures were all negative. They also report 2 cases of meningitis in which the typhoid bacilli were present; also a case of suppurative typhoid meningitis in which the typhoid bacillus was isolated from the cerebrospinal fluid, both during life and at autopsy. Cole³ divides the cases with typhoid meningitis into three groups: (1) Meningism, in which symptoms of meningitis are present, but there are no meningeal lesions and no direct relation between the bacteria and the symptoms; the condi-

¹ Münchener medicinische Wochenschrift, February 14, 1911, p. 357.

² Journal of the American Medical Association, March 25, 1911.

³ Johns Hopkins Hospital Reports, 1904.

tion is evidently produced by toxins, and similar states are found in other infectious diseases; (2) the serous meningitis of Quinke, in which there are symptoms of meningitis and serous exudate containing the typhoid bacilli; and (3) a suppurative or purulent typhoid meningitis. When symptoms of meningitis are present the cerebrospinal fluid is usually under increased tension, and withdrawal of the fluid, even when it is sterile, is followed by an improvement in the symptoms.

THE TYPHOID BACILLUS CARRIER. In the thirty-ninth annual report of the Local Government Board of England and Wales for the year 1909-10, there is a supplementary report on this subject by J. C. G. Ledingham. This report is rather voluminous, and contains a great many facts and observations, the chief of which have been noted in a review by Grimm.¹ It will be remembered that Koch pointed out the necessity for the supervision of typhoid convalescents, and that it was due to his recommendation that stations were established in southwest Germany for the study of the disease. The first experimental station was located at Trier; this was started in 1903, and there are at present eleven stations in active service. The use of these typhoid stations is to assist the local physicians in the diagnosis of typhoid fever, to ascertain the source of infection, to seek out infected persons, to make bacteriological examinations of the stools and urine, to watch for unhygienic conditions, and to make recommendations concerning them. It has been found for the most part that the highest percentage of typhoid cases eliminating typhoid bacilli in the feces occurs in the third week, and most observers agree that in 25 per cent. of typhoid cases the bacilli can be demonstrated in the urine. This bacilluria usually occurs late in the disease or during convalescence. It should be borne in mind that there may also be precocious carriers, that infants and young children, while forming a very small percentage of carriers, are usually overlooked, but may be a very grave source of danger. There are other individuals who may become infected with the typhoid bacilli and discharge large quantities of them, and yet not show any symptoms of the disease. The treatment of the intestinal carriers is so far rather unsatisfactory, and many different drugs have been tried. Sodium salicylate, in doses of from 3 to 5 grams daily, has been recommended perhaps more than any one thing, but the results are questionable. The bacillus may be harbored in the gall-bladder for a long time, and doubtless some drug that is excreted in the bile will have to be used in the cure of these cases. It is quite possible that starting with hexamethylenamine as a base, some such germicide may be discovered. The treatment of the urinary carriers is somewhat more satisfactory, although hexamethylenamine has not given the perfect results that were at first claimed for it. Niepratschk has

¹ Public Health Reports, March 17, 1911, p. 313.

suggested the use of borovertin (hexamethylenamine tetramine triborate).

The *diagnostic methods employed in searching for carriers* consist, first in making a Widal reaction, and perhaps three-fourths of the cases suspected may be discovered by the use of this method, and then further examination must be made of the stools and urine. Different methods are used in various laboratories, usually consisting of some special culture media which makes the task lighter than it otherwise would be.

Otto Mayr has suggested the foundation of convalescent homes for recovered typhoid cases, where examinations could be made and carriers discovered. In asylums and institutions, the simplest plan is to isolate carriers, and if they are allowed to work it should be under supervision. They should never be allowed to handle or prepare food; they should also have individual articles, such as dishes, basins, towels, etc., and the toilets should receive regular, systematic disinfection.

EXPERIMENTAL INFECTION OF THE GOAT WITH TYPHOID BACILLI. Scordo¹ has carried on a series of experiments in which he shows that goats may be infected with the typhoid bacillus either by way of the mouth or through intravenous injection. The animals did not show any particular disturbance of health except in the cases where the disease was transmitted by intravenous inoculation. The point of importance is that the infected goats were capable of acting as bacillus carriers for many months, the bacilli being excreted not only in the feces and urine in great quantities, but also for a long time through the milk, and these bacilli were virulent. The typhoid agglutinins were also excreted in the milk. Goats that had previously been infected with Malta fever were also susceptible to infection with the typhoid bacillus.

THE PURIFICATION OF WATER SUPPLIES AND TYPHOID FEVER. The subject of the purification of water supplies in large cities, and even in the smaller towns, is one which has received a great deal of attention, but the studies have chiefly been published in the technical journals relating to water engineering or to chemistry, and, despite the fact that some apparently most remarkable results have been obtained, they have received scant if any attention in the ordinary medical journals.

One method which seems to be of special value is the use of the hypochlorites, usually in the form of chlorinated lime. The action of chlorin in the water is quite remarkable, in that dilutions which would at first have seemed too weak to have any effect, inhibit the growth of most of the bacteria and, in fact, actually kill them, this being noticeably true of the colon bacillus and of its near relation, the typhoid. For example, in Jersey City, where chlorinated lime is added to the water

¹ Centralblatt für Bakteriologie, January 21, 1911, p. 290.

in the proportion of 0.03 grain per gallon, the examination of the water during the month of December showed, in the raw water, a maximum of 1600 bacteria and an average of 559, while in the water treated, the maximum was 30, the average 2.7, and the minimum none. There was a conspicuous absence of the colon bacillus. This method has also been in use in between 75 and 100 various other cities, among which may be mentioned Harrisburg, Hartford, Minneapolis, Montreal, Nashville, Quincy, and Toronto. The method is comparatively easy to apply, gives excellent results, and is to be recommended for consideration of those who have the prevention of typhoid in their hands. The method was first suggested by Traube, in 1892. Among the contributions which may be mentioned is one by Mason,¹ and one by Stokes.²

THE USE OF IPECACUANHA TO ABORT TYPHOID FEVER. Frazier³ has used ipecacuanha in 6 cases of typhoid fever, giving it in 30-grain doses in salol-coated capsules. The dose was repeated each day, diminishing it by 5 grains. The ipecacuanha was preceded by a dose of the tincture of opium. The patient was placed in a dark room and instructed to lie on the right side so as to favor the passage of the capsule into the stomach as quickly as possible. The results obtained in the 6 cases were that in 3 the temperature reached normal three days after the administration of the ipecacuanha, in 2 four days after, and in 1 seven days after. These results were so remarkable that a trial of this means of treating typhoid certainly should be made. An improvement in the method of administering the ipecacuanha is that employed by Beck (see Amebic Dysentery).

THE TREATMENT OF TYPHOID FEVER WITH SERUM. Forssman⁴ has treated 20 cases of typhoid with the serum prepared by Kraus. The number of cases treated is too small to draw any definite conclusions, but, in a general way, the patients treated ran a milder course than the average of the epidemic. None of the serums which have been suggested for the treatment have given results sufficiently encouraging to recommend their use to the general practitioner.

Kraus and v. Stenitzer⁵ have given their second report on the use of anti-endotoxic serum, which they have tried further in three epidemics. They believe that the injection of from 20 to 40 c.c. of this serum, which is derived from horses, will be followed by good results, especially if given early in uncomplicated cases. The general condition is very much improved, and several days after the injection the temperature declines. They believe this subject is worthy of further

¹ Chemical News, December, 1909, p. 321.

² Maryland Medical Journal, July, 1911, p. 204.

³ Medical Record, November 4, 1911, p. 923.

⁴ Deutsche medicinische Wochenschrift, October 19, 1911, p. 1936.

⁵ Ibid., March 30, 1911, p. 577.

investigation, and that they have influenced favorably the course of the disease.

Typhus Fever. THE TREATMENT OF TYPHUS FEVER WITH IODINE. Uftugéaninoff,¹ following the suggestion of Jaworowski, has used the solution of iodine in the treatment of typhus fever, with very encouraging results. He obtained the best results by the tincture of iodine, administered in red wine—the red wine masking the taste of the iodine better than any other vehicle. The results of the treatment are that the temperature changes rather quickly, and ends sometimes by crisis and sometimes by lysis, usually by the latter. In the cases which received the iodine early, the exanthem did not develop in the characteristic manner, and the general condition of the patients was very much better. The nervous manifestations were lessened, and delirium, if present at all, did not last as long as in the average case. The amount of iodine administered consisted of three or four drops of the tincture in an ounce of red wine, and this amount was given three or four times daily.

An admirable article on the problem of the treatment of typhus fever has been written by Wilder.² He is particularly competent to write on this subject, inasmuch as he was associated with Ricketts in his studies of Mexican typhus. The general results of his studies are similar to those given above. The article is highly recommended to anyone seeking the latest information on this subject. It also includes a bibliography which covers the more important articles for the last few years.

ETIOLOGY OF TYPHUS FEVER. We noted last year that Pradtetchensky described a bacillus resembling somewhat in general appearance the bacillus of plague, in the blood of patients suffering with typhus fever.

In a more recent communication he³ has given the results of his further investigation. Over 100 cases were examined during an epidemic, and during the height of the epidemic, in which most of the cases were extremely severe, the organism was found in the blood in nearly every instance. Later, as the epidemic began to die out, and light and abortive cases were examined, it was frequently not possible to demonstrate this organism. He also found that the organism was present in the urine and in the sputum of typhus fever patients, and that it persisted in both of these after the patient had recovered. He is of the opinion that the disease is spread through the sputum and the urine, and that certain convalescent patients may act as typhus carriers, playing the same role in the spread of the disease as the carriers of typhoid fever.

¹ Berliner klinische Wochenschrift, October 16, 1911, p. 1877.

² Journal of Infectious Diseases, July, 1911, p. 9.

³ Prakt. Vratsch, January 16, 1911; La Semaine Médicale, February 15, 1911, p. 78.

These observations are particularly interesting at this time, in view of the findings of Nicolle in the transmission of typhus fever by means of the body louse (*Pediculus vestimenti*), and also in the findings of Ricketts and Wilder in the transmission of the Mexican typhus by means of the same insect.

It might be noted that Ricketts, whose untimely death prevented his completing his investigations, had the idea that there was a group of diseases caused by bacilli and transmitted by means of insects, and he believed that plague, the Rocky Mountain spotted fever, Mexican typhus (*tabardillo*), and European typhus would be found to be due to organisms quite similar in appearance and characteristics.

THE TRANSMISSION OF TYPHUS FEVER. A most important contribution to our knowledge of typhus fever has been made by Nicolle¹ and his collaborators. His conclusions are drawn from clinical and experimental studies of the disease as it occurs in Northern Africa, and his original article is worthy of careful study by anyone specially interested in the subject.

His experiments were the continuation of those which he has been making for several years and which were noted in *PROGRESSIVE MEDICINE* (March, 1911, p. 238). He has proved that the European typhus may be transmitted by inoculation from man to chimpanzees and to various species of the macacus (*M. sinicus*, *M. thesus*, *M. cynomolgus*, and *M. inuus*). To these may be added an American monkey, the *Ateles vellerosus*. Other animals, with the exception of the guinea-pig, which he expects to make the subject of further study, do not appear to be affected by the disease.

The symptoms and the virulence of the experimental typhus are the same in the different species of monkeys which they have studied. The clinical picture is very similar to that observed in man, and almost identical with the European typhus in children. About a week after the inoculation the temperature suddenly rises, and in typical cases falls on the next day and gradually rises on the following days, making upon the chart an upright arrow followed by an angle open above and then a curved line of ascent. This temperature curve reaches a level from the seventh to the tenth day, and terminates by a drop, and a subnormal temperature is nearly always present for a short time after the defervescence. After several days the temperature returns to normal. Apart from the fever the symptoms are moderate, and incubation is generally silent. It is only toward the third or fourth day that any abnormal signs are observed when there is loss of appetite, dejection, and the hair stands on end. There is injection of the eyes, and sometimes an eruption. The eruptions always occur upon the face and the monkey also loses weight. In the severe cases death follows either during the

¹ *Annales de l'Institut Pasteur*, January, 1911, p. 1, and February, 1911, p. 97.

febrile period or in the period of subnormal temperature at the beginning of convalescence. In the light or abortive forms there is a prolongation of the incubation period, the fever lasts but a few days, the subnormal temperature is ephemeral, and the subjective symptoms irregular, with the exception of a certain degree of emaciation which never fails. In addition to these there are certain cases in which there is no apparent reaction on the part of the organism, and yet an immunity is sometimes acquired following these silent infections. The disease may be transmitted from monkey to monkey indefinitely. Nicolle succeeded in transferring it nine different times, passing through four different species of monkeys. The blood in this disease is virulent for the monkey in the first hours of the fever up to the second day of convalescence. The first attack of experimental typhus confers an immunity if the disease has been severe, no matter what the mode of the inoculation. The mild or abortive types are not necessarily followed by immunity, although, as noted above, immunity may sometimes follow when there has been even no apparent febrile reaction. In the positive cases the immunity is established very rapidly, and has been noted as early as the fourth day after the defervescence of the temperature.

The blood serum of convalescent patients or of the cured monkeys contains preventive curative properties either for experimental infection of the monkeys or the disease, as seen under ordinary circumstances in man. These properties are manifest in the tenth and twelfth days following the defervescence, and disappear rapidly later, and after the fifteenth or twentieth day the blood seems to have lost these properties entirely. These properties serve as a basis of treatment of the human typhus fever by the serum of convalescence. This method of treatment was suggested by Le Grain and Raynaud in 1895.

Neither the microscope nor the ultra-microscope shows the presence of any microbic forms either in the blood of patients or of infected animals, and the bodies discovered in the blood of patients with Mexican typhus (*tarbadillo*) by Ricketts and Wilder are too rare to be considered as specific agents in the disease. The non-filtered serum of patients or of infected animals is constantly virulent for the monkey when it is used after obtaining it by the centrifugalization of defibrinated blood, while that obtained by coagulation pure and simple is only exceptionally virulent. These two serums differ totally one from the other. The first contains the *débris* and the contents of the blood cells destroyed by the maneuvers of defibrination, and always a certain number of whole cells, while the latter contains neither cells nor *débris* if the separation of the clot from the serum has been carefully made. If it is not carefully made it may contain some *débris*, in which case it is virulent. The serum of the defibrinated blood centrifugalized and filtered through a Berkefeld filter has never been found virulent or immunizing in the experiments of Anderson and Goldberg or by Ricketts

and Wilder. The serum from coagulation filtered through the Berkefeld filter in one of Nicolle's experiments, produced immunity in a monkey, and Nicolle believes from this experience that the specific agent of typhus fever will pass through the filter, and he believes that the reason that the filtration of the defibrinated blood serum is not successful is that the debris and the colloid substances contained in the fluid fill up the pores of the filter and render it impermeable to even the finest microbes. He is of the opinion that the microbe of typhus fever is an intracellular organism. The virus is destroyed by heat from 50° to 55° C., and the inoculation of blood heated by this temperature does not produce any immunity in the monkey.

EPIDEMIC CAUSED BY THE BACILLUS TYPHUS MURIUM. Babes and Busila,¹ of Bucharest, have described an epidemic caused by this bacillus which has previously been supposed to affect only rodents, and never to attack man. This bacillus is extensively sold, and used to infect rats and mice, causing an exceedingly fatal disease in these rodents, and one which is very infectious, so that it has proved of great value in killing off these pests.

In the present instance a man and his wife spread the cultures about to kill off mice. Two days later both were taken ill with headache, coated tongue, nausea, pain in the abdomen, diarrhea, and fever. Two days later three children, the husband of the cook, and a neighbor who had used the culture presented the same symptoms. The disease lasted for over two weeks, and all the symptoms were very intense. The organism was recovered from the blood, urine, and stools, and was agglutinated by a serum prepared with the typhus murium in dilutions of 1 to 10,000. This serum did not produce agglutination of the paratyphoid B. in dilutions less than 1 to 2000. It must be noted that the organism was also agglutinated by the paratyphoid serum in dilutions of 1 to 2000, but there seems to be no doubt that the disease was one of infection by the mouse typhus, and should this happen very often, it would mean that a very dangerous method was being used to exterminate rats and mice.

Whooping Cough. **THE HEMOLYTIC TEST FOR SUSPECTED WHOOPING COUGH.** Delcourt² has applied the Bordet-Gengou hemolytic reaction in an epidemic of whooping cough, and found a number of cases so mild that infection was not suspected. He believes that there are cases of masked pertussis common both in children and adults, and that this method of diagnosis may be of value in the prophylaxis of the disease.

VACCINATION AND WHOOPING COUGH. It has been supposed that for a long while the course of whooping cough is influenced favorably by a successful vaccination of ordinary vaccine virus, such as is used

¹ La Semaine Médicale, December 29, 1910, p. 613.

² Bulletin de la Société de Pédiatrie, November, 1910.

for producing an immunity from smallpox. This method has not, however, been used, as far as I know, very extensively.

Mehnert,¹ in South Africa for the past four years, has had occasion to try this method in a number of cases. His patients were between the ages of three and nine months. As soon as the diagnosis of whooping cough was established, the patient was vaccinated in the ordinary manner. As soon as the vaccine pustule developed the paroxysms of cough became less severe, and disappeared completely in fifteen days at a maximum. In whooping cough in children who have not been vaccinated this method certainly deserves a thorough trial, inasmuch as one gets the benefit of the vaccination, and if it influences whooping cough favorably it certainly deserves to be used.

Yellow Fever. HISTORY OF YELLOW FEVER IN WEST AFRICA. Boyce² has reviewed this subject which is of great interest at this time, when Africa is beginning to open up to mining and industrial enterprises of all kinds.

Boyce shows that yellow fever is far more prevalent than is generally supposed, and he believes that it is endemic among the natives of the coast towns just as it was among the creoles and the yellow-skins of Havana, Rio, Santos, and other South American places. He gives a timely warning to miners and merchants in regard to taking rational precautions of segregation and the destruction of the *Stegomyia* on the west coast. It is very probable that the disease was introduced into West Africa by the slave-ships, although the early history of the disease is shrouded in mystery.

Boyce's article is a very complete summary, and deals with the progress of the disease in Sierra Leone, Southern Nigeria, Gambia, etc. The disease has occurred sporadically or in an epidemic form certainly since 1807, with few gaps, for example, between 1852 and 1858, 1868 and 1872, and some others; but from 1890 there is an unbroken line, and the fact that it has occurred so regularly makes it reasonable to suppose that the fever has never completely died out along the coast.

THE NATURE OF THE VIRUS OF YELLOW FEVER, DENGUE, AND PAPPATACI FEVER. Craig³ has called attention to the similarity of the viruses of these three diseases, and some of the facts concerning them are worth recounting.

The facts concerning yellow fever may be briefly stated: That this disease is naturally transmitted through the bite of a mosquito, *Stegomyia calopus*; that the mosquito in order to become infective must bite the patient during the first three days of the fever, and must live for at least twelve days afterward; that the disease may be produced by

¹ La Semaine Médicale, June 28, 1911, p. 308.

² British Medical Journal, January 28, 1911, p. 181; February 4, 1911, p. 249; February 11, 1911, p. 301.

³ New York Medical Journal, February 25, 1911, p. 360.

the subcutaneous or intravenous inoculation of unfiltered or filtered blood removed from the patient during the first three days of his illness, and lastly, that the disease is not contagious.

The organism of yellow fever has not been discovered, but doubtless belongs to a class of ultramicroscopic parasites. The French Commission composed of Marchoux, Salimbeni, and Simond added to these facts, the fact that so small an amount as 0.1 c.c. of blood injected subcutaneously could produce the disease, that in defibrinated blood preserved under liquid petrolatum the virus remains active for five days but becomes inactive in eight days, although such blood is capable of conferring a relative immunity, that five minutes' heating at 55° C. renders the virus harmless, and exposure to the air at temperatures between 24° and 30° C. renders the virus inactive.

In regard to *dengue*, the principal experiments have been made by Craig and Ashburn in the Philippines and by Graham in Beirut. The parasite which causes this disease cannot be demonstrated either in fresh or stained specimens of blood, and the disease may be produced by the injection of filtered or unfiltered blood, that the disease may be transmitted by the mosquito, *Culex fatigans*, Wied, and this is probably the most common method of transmission. The period of incubation in experimental cases averages three days and fourteen hours, and certain individuals are immune. The disease is not contagious, but is transmitted in a manner similar to that of yellow fever.

Pappataci fever has only been known a short time, and is a disease which occurs in Bosnia, Herzegovina, Dalmatia, Malta, and probably in India. It resembles dengue in a general way, but is less severe, and the fever is of shorter duration.

The disease was discovered by Doerr, Franz, and Taussig, who were appointed by the Austrian War Office to investigate a fever which was occurring among the soldiers stationed in Herzegovina and Dalmatia. The disease occurs only in the summer months, from May to October, and always attacks newcomers. There is fever lasting three days, followed by a slow convalescence, taking from eight to fourteen days. Taussig thinks the disease might be transmitted by a sand-fly, *Phlebotomus pappatasi*, and he and his colleagues definitely proved this to be true. They were also able to transmit the disease by filtered or unfiltered blood, and they found that the blood was infective during the first twenty-four hours of the attack, that the virus disappeared from the peripheral circulation within forty-eight hours, and that the fly does not become infective for a period of eight days after biting the infected individual. These researches have been confirmed by Birt in the Island of Malta, who found the incubation period varied from three days and sixteen hours to seven days and that the virus would retain its activity *in vitro* for a week.

These three diseases resemble one another very closely, and if anyone

can discover anything concerning the virus of one, he will undoubtedly clear up the problem in the other two.

They are all caused by a filterable virus, are transmitted by insects, have a sudden onset, a comparatively rapid course, and terminate by crisis rather than by lysis.

The pappataci fever is the mildest, and yellow fever the most severe, while dengue occupies a position between the two. In all three the virus is present in the blood, but only during certain periods. In yellow fever the virus is present during the first three days of the disease, in pappataci fever during the first day, and in dengue, as far as is known, during the third and fourth days. The incubation period is strikingly alike, in yellow fever the average period being three days and twelve hours, in dengue three days and fourteen hours, and in pappataci fever three days and eighteen hours, when the injection of unfiltered blood is used. The period with the injection of filtered blood is: Yellow fever, an average of two days and fifteen hours; dengue, two days and fourteen hours; and in pappataci fever, four days and sixteen hours. The virus undergoes a cycle of development within the transmitting insect, although this has not been definitely determined for dengue. In yellow fever the mosquito does not become infective until twelve days after it has bitten the infected individual, and in pappataci fever the fly does not become infective for from seven to ten days. When the disease is transmitted by the bite of an insect, the average incubation period is, for yellow fever, three days and eighteen hours, in dengue four days and eighteen hours, and in pappataci fever five days and twenty hours.

DISEASES OF CHILDREN

By FLOYD M. CRANDALL, M.D.

THE pediatric literature of the last year, like that of the last two or three years, has consisted in considerable measure of articles on poliomyelitis, meningitis, and other infectious diseases. The prevention of disease in early life has received full share of attention. In the President's address before the annual meeting of the American Pediatric Society, Henry D. Chapin¹ considered the fundamental principles of pediatrics, and said that the subject might be divided into two parts: (1) That relating to the treatment of disease and perversion of function; (2) that concerned with the production of well-developed physique in children. More attention is usually paid to the first than to the second of these branches. Chapin believes that the scope should be broadened so that pediatrics might be defined as that branch of science which concerns itself with the animal aspect of the production of human beings. The science could then be divided into two parts: (1) That devoted to the production of the highest development of the human being as an animal; (2) that concerned with the management of the growing human animal when malformed, or retarded by perverted functions, or subjected to mechanical injury, or attacked by micro-organisms. It is evident that the pediatricist should be versed in general biology and many other subjects which shed light upon the many problems which he is called upon to solve. It would prove an advantage to all physicians if the fundamental principles of the management of infants could be firmly established, and thus taken out of the field of discussion. In order to attain this result, it is essential that the teachings concerning the chemistry of feeding be in accordance with the general science of chemistry; that the problems of infancy falling in the province of physics be recognized as such; and that the teaching concerning animal life and development be true to those principles which have been found to apply to life in all its forms.

Septic Infection in the Newborn. Under this title might be placed many of the abnormal conditions which appear during the first few weeks of life. Certain forms of icterus and most of the hemorrhagic conditions are now known to be due to some form of infection. In fact, it is wise for the practitioner to seek for infection in most of the abnormal conditions which arise in the newborn. Baginsky² writes upon the

¹ Journal of the American Medical Association, August 19, 1911.

² *Riforma Medica*, January 1, 1911; Journal of the American Medical Association, March 4, 1911.

subject of general infections in children. He reports a case of general sepsis evidently originating in the tonsils. Pneumococci were also found in the appendix. In a second, staphylococci were responsible. He has noticed signs of primary visceral tuberculosis in 24 children dying from malignant scarlet fever in the last few years and also in 19 cases of malignant diphtheria, but no signs of tuberculosis or syphilis were apparent in the majority of his cases of fulminating sepsis in children.

The well-known fact is referred to by Taylor-Jones¹ that the avenue of entrance of infection often cannot be recognized clinically. She reports an instructive case in which the postmortem examination alone demonstrated the portal of entry; and not only the portal of entry, but the fact that absence of signs in certain cases is of little value. This baby, which had apparently been perfectly healthy for ten days of its life, died when twelve days old, of a streptococcus infection whose course was by way of the umbilicus through the left hypogastric artery. At no time was there any sign other than perfect health at the navel. It is impossible to say when the infection occurred, but it would seem that the most reasonable presumption would put it at the time of, or soon after, the separation of the cord on the fourth day. The physiological thrombus of the left hypogastric would probably not be broken down by sepsis for several days, and several more days might be required to have the circulation of the organism in the blood show evidence by elevation of temperature and external signs. Had it taken place at the time of birth, infection would probably have manifested itself several days earlier because of the organisms passing directly into the blood current before the formation of the thrombus. The skin lesion, the first manifestation in this case, is, though not unusual, certainly not the usual feature, and the average case is that of the ten-day-old baby dying without apparent reason.

Hemorrhagic Disease of Infants. The hemorrhagic diseases have been, until recently, the most dreaded diseases of the newborn. The mortality has been very high, and in the large proportion of cases treatment has been futile, recoveries being more often due to the mildness of the attack than to the efficiency of the remedial measures. I have reported² in considerable detail the remarkable results obtained by Welch, of New York, who reported 12 cases, with 12 recoveries, and has since reported 6 cases with 6 recoveries. His method was the *injection of the serum of human blood*. One of the most important articles of the last year was that of Schloss and Commiskey.³ According to the classification of these authors, the hemorrhages which occur during the first few days of life may be traumatic, accidental,

¹ American Journal of Diseases of Children, September, 1911.

² PROGRESSIVE MEDICINE, March, 1910, p. 249.

³ American Journal of Diseases of Children, April, 1911.

or spontaneous. The traumatic hemorrhages are usually due to injuries received during labor or consequent on some operative procedure. The term accidental may be applied to two varieties of hemorrhage: (1) The hemorrhage which may be due to inadequate ligation of the umbilical cord, and (2) the slight vaginal bleeding which gives rise to no apparent symptoms and is unaccompanied by bleeding from other sources. The latter is termed by Lequeux physiological. Spontaneous hemorrhage may arise from almost any organ or tissue and may be associated with different pathological conditions. In general, two different classifications have been followed. In some instances the classification is based on the apparent origin of the hemorrhage; in others, an etiological classification has been attempted.

The whole group of hemorrhages has been included under the hemorrhagic diathesis or disease of the newborn, or hemophilia neonatorum. According to the origin of the hemorrhage, cases are described as melena, purpura, cerebral, umbilical, hepatic, or adrenal hemorrhage. In many cases the greater part of the external hemorrhage is from the umbilical cord or from the gastro-enteric tract, and the terms melena and omphalorrhagia have been used in a generic sense. The cases of melena have been subdivided into *melena symptomatica*, when the hemorrhage is the symptom of some obvious disease; *melena spuria*, when the blood vomited or in the stools is from other sources than from the gastro-enteric tract; and *melena vera*, or idiopathica, when there is no apparent cause for the hemorrhage. Similarly, the term omphalorrhagia idiopathica has been used for umbilical hemorrhage of obscure causation. Runge divides the umbilical hemorrhages into two groups. In the first group the hemorrhage is from the lumen of the vessels and may occur before or after the separation of the cord. The hemorrhage of the second group is parenchymatous and takes place by oozing, as though squeezed from a sponge.

The authors have treated seven newborn patients with hemorrhage by means of subcutaneous injections of human blood. The first patient was treated with an injection of 20 c.c. of human blood serum, and later, an injection of whole blood. The whole blood was used instead of the serum for the reason that it was easier to obtain and could be used immediately, the time required for the serum to separate being saved. It seemed an additional advantage to inject not only the serum, but also the formed elements which have influence on the coagulation of the blood. In most cases the blood was taken from one of the parents. The amount required was withdrawn from a vein of the forearm by means of an exploratory syringe and injected immediately into the subcutaneous tissue of the infant's back.

Of the 7 infants thus treated, 6 recovered and 1 died. The fatal case was an infant who had suffered from multiple hemorrhages for eight days, and died three and one-half hours after admission to the

hospital. In 5 of the 6 cases in which recovery took place, the hemorrhage ceased soon after the treatment, and at the same time there was marked improvement in the general condition. In the remaining case, a positive Wassermann reaction was obtained; the hemorrhage was only slightly improved after the blood injections, but ceased after the use of mercurial treatment. Whether the blood injections were of value in this case was difficult to determine. In every case the blood was entirely absorbed within a few hours, and, so far as could be determined, had no bad influence on the patient's general condition.

Lespinasse and Fisher,¹ after a study of the literature, conclude that *direct transfusion of the blood* is the ideal treatment for hemorrhage of the newborn; it meets and overcomes the three chief indications—hemorrhage, anemia, and infection. It checks the hemorrhage at once. It cures the acute anemia. It fills the baby's veins with a plasma that is more resistant to infections than is the original plasma. In the cases without syphilitic taint, direct transfusion is specific. Direct transfusion is best performed early, but it is never too late, and the operation should be tried in every case before the child dies. It is to be noted, however, that the personal observation of these authors is limited to a single case.

Green and Swift² present an excellent paper based on fifty-one cases observed at the Lying-in Hospital during six years. These babies were 1.14 per cent. of the whole number born. Careful study was made of the condition of the mothers and of the complications during birth, none of which seemed to have any bearing upon the hemorrhagic condition. The average age at the onset was three and one-half days. After ten days it would seem that the disease is rare, and when it does occur the prognosis is good. Cases are divided into three distinct groups, as follows: (1) Those in which the hemorrhage is chiefly from the umbilicus; (2) those in which the hemorrhage is chiefly from the mucous or serous membranes; (3) those characterized principally by the formation of subcutaneous purpuric patches or ecchymoses. These types the authors designate, respectively, the umbilical, the seromucous, and the purpuric, according to which form of hemorrhage predominates. The important bearing of this classification is on prognosis. The mortality of the umbilical type is about 60 per cent., that of the seromucous type about 50 per cent., and that of the purpuric type about 22 per cent. The treatment of these patients was supportive, hemostatic, and by means of normal rabbit serum, which was given subcutaneously in 30 c.c. doses, repeated two or three times, in case the bleeding occurred after the first dose.

A case of *purpura* in a child, aged eight years, with fatal termina-

¹ Surgery, Gynecology, and Obstetrics, January, 1911.

² Boston Medical and Surgical Journal, March 30, 1911.

tion from cerebral hemorrhage, is reported by Schmey.¹ The author believes that purpura is not a disease *sui generis*, but consists of a number of processes combined in an uncertain manner. Previous infectious disease seems to be a cause in its production.

The *serum treatment* in hemorrhagic disease of the newborn is discussed in an editorial article,² in which two marked cases are referred to. One of these is that reported by Steele,³ and the other was observed personally by the writer. The method is approved because it can be performed much easier than the direct transfusion of blood. It can be readily utilized by the practitioner when danger is threatening, but not grave; whereas actual transfusion, for obvious reasons, is rarely resorted to except in extreme cases, and those in which conditions may already be so serious that the chances of recovery are small.

Asphyxia Neonatorum. In opening a discussion upon this subject before the British Medical Association, Sir Francis Champney⁴ spoke of the predisposing causes of the first breath, one of which was the shrinking of the placental site, and later separation of the placenta. The child might not breathe when first born, but if the cord was beating regularly no anxiety need be felt, as the child was still respiring by the placenta. The exciting cause of the first breath is contact with the cold air. There are two varieties of asphyxia: (1) Apoplectic or livid blue; (2) syncopal or white, pale, flabby. The second form appears more frequently in head-last cases. If the head, in these cases, is not delivered in three or four minutes, the child generally dies. The first breath may draw foreign matters into the throat or lungs. As to the question of *prognosis and treatment*, in a general way it may be said, that the blue cases nearly all recover and the pale ones frequently die. The blue cases may be left alone after cleaning out the mouth. In the pale cases, the reflexes are lost and the pupil dilated widely. The child should be laid on the back, the mouth wiped out, and the throat gently pressed. A catheter may be passed into the larynx. It should pass down three and one-half inches from the lips in order to reach the glottis, and after it is placed *in situ* it should be blown down and not sucked up. The catheter can then be secured by an elastic band. In doing artificial respiration, pressure on the thorax is good in adults, but bad in newborn children. The best method of artificial respiration is that known as Sylvester's. In performing it, it is absolutely necessary to attend carefully to the following points: The arms should be everted and held above the elbows. In performing Schultze's method the important point is that the whole body of the child should be supported by the fingers under the armpits and that

¹ Deutsch. med. Woch., 1911, vol. xxxvii, p. 307.

² Therapeutic Gazette, September, 1911.

³ Yale Medical Journal, March, 1911.

⁴ Medical Record, August, 26, 1911.

the chest should on no account be grasped. In doing mouth to mouth inflation the physician should blow through a cloth, and the nose should not be held. By the first precaution the danger of transmitting tuberculosis to the child is avoided, and by the second, the possibility of rupturing the lungs. The method of rhythmical traction on the tongue, known as Laborde's, is worthy of trial. To sum up, he advises that the physician should never hurry. Before commencing the treatment he should endeavor to diagnosticate the cause of the asphyxia. If the heart is beating ever so slowly, the child is not dead, though slowness of heart beat shows a more dangerous state than feebleness. Whatever method is adopted, it should not be discontinued until the child breathes regularly.

Ophthalmia Neonatorum. "Five minutes' attention at the critical moment may save seventy years of blindness," asserts Flanders,¹ of Dover. Credé's method is now followed in nearly all public institutions, but not in private practice to the extent it should be. All physicians should employ it as a routine practice in obstetrics. Every obstetric bag should contain one-half dozen soft gauze sponges, and one dark amber dropper bottle, filled with a 1 per cent. solution of nitrate of silver. Successful treatment demands skilled nursing and perfect technique. The eyes must be cleaned of pus every hour, day and night; the warm boric acid solution is probably as good as any other for this purpose. Every two hours let the nurse instil two drops of a 25 per cent. solution of argyrol freshly prepared, and once a day let the physician apply to the everted lids a solution of nitrate of silver not stronger than 2 per cent.; allow the solution to stay on thirty seconds, then swab with normal salt solution.

The Urine in Infancy. Some interesting experiments are reported by Hamill and Blackfan² on the *frequency and significance of albumin in the urine of apparently normal children*. Extensive observations were made upon 124 children, from which the following conclusions may be drawn: (1) There was no relationship between the specific gravity and the form or amount of albumin. (2) The reaction had no influence on the production of albumin. (3) Sugar, acetone, and diacetic acid were never found. They may, therefore, be considered as having no bearing on the production of albumin. (4) Indican, phenol, and urobilinogen, when present, were usually associated with albumin, but albumin was sometimes absent when they were all present, and the amount was never greater when associated with them than it was in the cases in which they were absent. (5) Crystals, when present in amounts occasionally found in normal children, are in no way responsible for the associated albumin. (6) The mild disturbances of the intestinal digestion, as shown by the examination of the stools, were

¹ Journal of the American Medical Association, June 17, 1911.

² American Journal of Diseases of Children, February, 1911.

not sufficient to account for the occurrence of albumin. (7) The blood pressure was within the normal range in all cases and, therefore, did not influence the albumin output. (8) The albumin elimination was the same on mixed and exclusive diets. (9) No children were found in whom the albumin excretion corresponded to the requirements for postural or orthostatic albuminuria, a rather surprising result in view of the frequency with which this condition is supposed to occur. (10) Thirty-two and one-half per cent. of the children showed occasional hyaline casts and cylindroids in their urines. The authors do not consider their occasional presence as indicative of lesion of the kidneys, but rather as suggesting a temporary overtaxation of the kidneys, resulting from variations in the habits of life of the individuals which are too slight to be recognized. (11) Eighty-eight and seven-tenths per cent. of the urines of these 124 children showed albumin, 27.4 per cent. showing serum albumin alone and in combination; and 85.4 per cent. an albuminous body precipitated by acetic acid in the cold. These two albumins were nearly always present in very slight traces. In 38 children, the twenty-four-hour specimens showed nucleo-albumin in all but 1, and in this case samples examined over long periods of time showed nucleo-albumin frequently. In these 38 children, the percentage of serum albumin was very much higher (42.1 per cent.) than in the total number of cases examined. It is probably possible to demonstrate, in the albumin of every presumably healthy child, traces of an albuminous body precipitated by acetic acid. Consequently, this substance must be regarded as an exceedingly common, if not constant, manifestation in the urine of children under fourteen years of age, and as of no clinical significance. The authors do not believe that serum albumin, in the amounts in which it appears in these children, indicates a diseased condition of the kidneys any more than does the presence of hyaline casts and cylindroids, and that its etiology may be considered the same as that given for these former elements.

The *diagnostic importance of glycosuric acid* in the infant's urine is the subject of a paper by Mayerhofer.¹ He failed to find the reaction when the infant was in health, but obtained it at once upon the appearance of any illness, particularly any of the febrile intestinal troubles. After prolonged illness the reactions may be negative, owing apparently to exhaustion of the ability to eliminate glycuronic acid. Mayerhofer, from these observations, points out the danger of administering camphor to children suffering from inanition, particularly to those who have acute diarrheal disorders.

The occurrence of *hippuric acid in the urine* of normal breast-fed infants has been investigated by Amberg and Knox² who conclude that the absence of demonstrable amounts depends on the absence of

¹ Zeitschrift für Kinderheilkunde, December, 1910.

² American Journal of Diseases of Children, October, 1911.

benzoic acid. Most authors agree that the benzoic acid normally entering into the production of hippuric acid in man is either derived from benzoic acid or related substances contained in food, or from putrefactive processes in the intestinal canal. Since it is known that putrefactive processes are, as a rule, in abeyance in the intestinal canal of perfectly normal breast-fed infants, the absence of hippuric acid from the urine would not be surprising.

After studying the *relation of meat ingestion to indicanuria* in children, Fleischeur,¹ of San Francisco, concludes that: (1) With an ordinary diet containing meat once daily, children, aged six, nine, and twelve years, succeed in digesting their food fairly well without much putrefaction in the digestive tract. Three-year-old children, on the other hand, with the same diet are much more apt to show indicanuria. (2) The giving of meat twice daily produces, in nine- and twelve-year-old children, practically no change in the amount of intestinal putrefaction. (3) In six-year-old children, and more markedly in three-year-old children, meat given twice daily gives rise to a decided increase in the indicanuria and is a cause of pronounced putrefaction of the intestine. (4) These observations seem to point to one definite conclusion, and that is, that the giving of meat more than once daily to children under nine years old is a practice conducive to intestinal putrefaction and indicanuria, and is to be deprecated on account of the harm resulting to the organism from the constant presence of abnormal products of putrefaction.

Von Reuss² says that *indican* is frequently found in the urine of breast-fed children in the first week of life, sometimes in notable amount, without the presence of any pathogenic conditions that are clinically observable. It is found in children in good condition as well as in those failing to increase in weight, in those having frequent evacuations of the bowels as well as in those having a tendency to constipation, and in those taking a scanty amount of food as well as in those taking food abundantly. The indicanuria, as a rule, is lacking on the first day, rare on the second, and most frequently and abundantly found on the third and fourth days; but it is not a rare occurrence during the following days. Two possibilities must be considered with reference to the cause of this indicanuria. Although the meconium and the stool from the breast milk show no signs of putrefaction in the intestine, still the occurrence of putrefactive bacteria makes it possible that there is a formation of indol from the intestinal secretion as the cause of indicanuria. On the other hand, if the assumption of a parental origin of the urinary indican is admitted, the indicanuria of newborn children may be taken as an evidence of tissue destruction and may be brought into relation with the well-known symptoms of such a process.

¹ American Journal of Diseases of Children, October, 1911.

² Zeitschrift für Kinderheilkunde, 1911, vol. iii.

Possibly also the increase of uric acid in the organism of newborn children plays a role in the production of indicanuria.

The Uric Acid Infarcts of the Kidney. The metabolism of nitrogen, phosphorus, and the purin substances in the newborn, with special reference to the causation of the uric acid infarcts of the kidney, is the subject of an extended paper by Schloss and Crawford.¹ The frequency of this condition is well known. They have varied in the experience of different observers from 40 per cent. to 62 per cent., and some have asserted that they are present to a slight degree in every infant. The observations of the writers were conducted in great detail on nine full-term male infants who were nursed by their own mothers. Labor was normal in all cases. The mothers received only small amounts of chloroform; never enough to induce narcosis, and rarely more than 30 c.c. All of the infants were apparently normal at birth and remained so during the period of observation. Two of the infants showed a very mild degree of jaundice. From these observations, the following conclusions may be drawn: (1) The uric acid output in newborn infants is both absolutely and relatively high. It is greatest during the first three days and then decreases. In cases in which the umbilical cord was ligated late, the output of uric acid was greater during the second and third days than in cases in which the cord was ligated immediately after birth. The quantity of the purin substances in the colostrum ingested is too small to explain the observed high uric acid output. (2) The total phosphorus excretion was high during the first three days and then showed a sharp diminution. There is marked retention of phosphorus by the newborn infant. (3) There is a moderate nitrogen retention during the first three days of life. Later, nitrogen is retained in large degree. (4) There is an inverse ratio between the leukocyte count and the elimination of phosphorus and uric acid during the first few days of life. (5) In the light of our present knowledge, the parallelism between the excretion of uric acid and phosphorus during the first three days would seem to indicate a common origin from cell nuclei. The greater excretion of uric acid in the late ligation cases suggests that the formed elements of the blood in some way serve as its origin.

Purulent Infections of the Urinary Tract in Infants. These infections are by no means uncommon in infancy and are not infrequently overlooked. A persistent high temperature in a young child, particularly if intermitting in character, should suggest careful examination of the urine. Such examination will not infrequently throw light upon a fever which has been obscure and puzzling. Brennemann² calls attention to the frequency of the disease, and to the almost equal frequency with which it is overlooked in general practice. The babies are alarm-

¹ American Journal of Diseases of Children, March, 1911.

² Journal of the American Medical Association, March 4, 1911.

ingly ill, and have a long-continued, septic fever. The diagnosis is easy and positive, but is frequently not made because it has not yet become generally known that pyelitis or pyelocystitis is so common in infancy. The clinical picture is a fairly constant one. A female infant becomes suddenly ill, with a high temperature and restlessness. Thompson has emphasized the recurring chills as a characteristic symptom, finding them in 8 out of 15 cases. The rareness of a distinct chill in early childhood makes this a valuable symptom. The respiration is often disproportionately increased, and a slight cough is common. There is frequently some indigestion that can easily lead to an improper diagnosis. The child is usually rather excitable, wide awake, restless, the eyes are bright, and the face sometimes wears an anxious expression. It is commonly very sensitive to handling, especially when made to sit up or when lifted by the shoulders. This is probably due to the fact that there is tenderness over one or both kidneys.

The course of the disease, if untreated, is essentially chronic. The temperature persists as a septic, remittent, or even intermittent fever. These cases are often diagnosticated as malaria, typhoid, food intoxication, or, if the nervous symptoms are marked, as is frequently the case, as meningitis, and later, when the condition shows no tendency to improvement, as chronic tuberculosis of uncertain localization. In many cases the disease becomes distinctly intermittent; days, weeks, or even months of normal temperature and general well-being, with rapid gain in weight, will separate periods of a week or several weeks of high fever and all other symptoms of a fresh acute infection. The positive diagnosis is made when pus is found in the urine. The amount of pus varies much in different cases and in frequent specimens of the same case. Commonly the urine appears turbid, sometimes even thick and milky. Frequent urination and tenesmus seem to occur in only a small number of cases, and can hardly be accorded much, if any, diagnostic significance. The great majority of cases occur during the first year, with special predilection for the second and third quarters of the first year. After the second year they are relatively rare and probably approach the adult type. Infection takes place more frequently during the summer months. This suggests a connection with summer diarrhea, and it is a significant fact that many of these cases are preceded by a food disturbance. Social status has less significance than one would expect. The *Bacillus coli communis* is the direct cause in the great majority of cases, in about 97 per cent. of both Escherich's and Goeppert's series. In the remaining cases, the common pyogenic bacteria is the cause.

TREATMENT. There is little that can be offered in the way of prophylaxis, except local cleanliness, avoiding diarrheas and infections, and the maintaining of the general health at a high level. After the disease is established the child should be kept quiet, its diet should be

watched carefully, and it should be given an abundance of liquids, especially water or alkaline waters, to flush the urinary tract. Nearly all German and American physicians depend upon urinary antiseptics (urotropin and salol) as of first value, and recommend alkaline drinks as of value in diluting and possibly alkalizing the urine. Heubner recommends *urotropin* in doses of 1 or 2 grains three times a day. Finkelstein prefers salol. Goeppert uses salol in all acute cases, in doses of from 1 to 3 grains, five to eight times a day, for ages varying from two months to two years, and finds, "as early as thirty hours after its administration, a decided improvement in the general condition." After the acute stage he uses urotropin and throughout urges the ingestion of large amounts of *water*, especially alkaline water, even giving it by gavage and enema if not well taken by the mouth. He expects a cessation of fever and of discomfort in the first two or three weeks and a pus-free urine in five weeks, and maintains that many cases get well in from five to eight days. Such rapid improvement is not the rule. Many cases drag along for months, often with distinct intermissions, in spite of any treatment.

Ramsey¹ advises the giving of large amounts of *alkaline water* as of the first importance. Frequently there is great thirst attending the fever, and the infant will take large amounts of water. The diet should be of a bland character. Urotropin or salol in full doses are the two drugs which give the best results. As a means of prevention, rectal discharges should be removed as soon as possible and the genitals, especially in female infants, cleansed by sponging from before backward, as it is readily seen how fecal matter could be easily introduced into the mouth of the urethra when the above process of cleansing is reversed. Box,² in discussing the different methods of treatment which have been proposed for these conditions, calls attention to the fact that many of the most acute attacks clear up spontaneously or yield to the simplest treatment. To get an idea of the efficiency of any particular method, it should be employed in a chronic and persistent case.

Pardoc³ believes that the main points to be relied upon in the treatment of acute cases are: (1) Absolute rest in bed; (2) the induction of free diuresis; (3) to render the urine alkaline; (4) the use of urinary demulcents and sedatives; (5) abstention from instrumental interference; (6) practically a milk diet.

In chronic cases, the lines upon which treatment should be pursued are the following: (1) In mixed infections, particularly where the pyuria is considerable, thorough washing of the bladder with one of the milder antiseptics is useful, inasmuch as it relieves the frequent desire and the pain after micturition. (2) The drugs useful in the acute

¹ Pediatrics, January, 1911.

² Ibid.

³ Ibid.

cases are also useful in those more chronic forms, namely, benzoates, sandal-wood oil, hyoscyamus in large doses, and when the infection is mixed with pus-producing organisms, such as the staphylococci, *Bacillus faecalis*, and the like, urotropin, helmitol, cystamin, and similar drugs are of value. (3) A vaccine is of the greatest possible benefit, and properly administered is capable of ameliorating symptoms to a remarkable degree.

Thrush. Speaking in the strictest terms, thrush is a symptom rather than an actual disease, and often indicates an impaired condition of the system. Eustace Smith¹ writes an article of considerable interest upon the subject. The parasitic growth which constitutes thrush, consists of a mycelium and spores of a cryptogamic vegetation which was first described by Robin under the name of *oidium albicans*. The fungus has now been identified by Haller as identical with the *oidium lactis* which results from the acid fermentation of milk. The mucous membrane of the mouth is first seen to be red, and its secretion has a distinctly acid reaction. In the course of a few hours little white points appear upon the reddened surface, especially on the cheeks and on the inner surface of the lips. These increase in number and size, and by the second day have united into patches which cover a considerable extent of the surface. Even before the appearance of the white points, a gentle scraping of the mucous membrane reveals to the microscope many spores of the fungus. These are elongated cells—egg-shaped bodies—which are often attached to one another by their ends, so as to form groups of two, three, or four. The white points are found, upon examination, to consist of these connected spores, combined with scaly epithelium from the mucous membrane, detached spores, and molecular deposits. The white, newly formed membrane coats the interior of the mouth and gullet, but is usually confined to parts covered with scaly epithelium, for it avoids the nasal passage and seldom penetrates into the larynx. The advance of the membrane down the alimentary canal was for a long time supposed to be arrested at the cardiac end of the stomach; but Parrot asserts that the fungus is occasionally discovered in the stomach and bowels.

TREATMENT. Perfect cleanliness is indispensable. Directly after the infant has taken the bottle, the mouth should be swabbed out with a piece of soft linen rag, or a large camel's-hair brush, moistened with warm water. Afterward the whole interior of the mouth should be brushed over with a solution of glycerin and borax. If this treatment is repeated after each meal, it will not be long before all signs of fungus have disappeared.

In the more serious examples of the complaint the same local treatment must be employed. If the fungus be suspected to have passed

¹ Pediatrics, June, 1911.

into the gullet, the child may be forced to swallow a few drops of the wash diluted with water. If superficial ulceration be seen, 10 grains of sulphate of zinc may be added to each ounce of the wash, for use as an application to the mucous membrane. In the worst cases in which the parasitic coating is widely spread, the deposit must be removed by painting it with 3 or 4 grains of papain mixed with glycerin, and then treating the uncovered surface with a solution of resorcin (5 to 20 grains to the ounce of normal saline). The chief factor in treatment in these cases is to improve the child's nutrition and increase his strength.

Rachitis. A review of studies that have been made upon this disease since the year 1900 is presented by Zybelle.¹ He does not believe that organotherapy has yet accomplished any specific results, but aids somewhat through a general stimulating effect. Phosphorus is still the most efficient drug. Recent physiological investigations have shown the reason for its use, which has long been empirical. It has an effect on mineral metabolism in preventing the waste of lime. It is much more efficient when combined with cod-liver oil. The mixture should be made fresh at least once in ten days. So far as treatment is concerned, according to Zybelle's investigations, we have made no material advances during the last two decades. The thyroid treatment of rickets has been studied by Variott and Pironneau.² They believe that it merely accelerates the growth of the rachitic child, which is usually retarded. They report five cases in which growth in height and general development was pronounced. The children seemed to be decidedly benefited by the thyroid, and relief of the rachitic condition seemed to be somewhat hastened. Hirschfeld³ believes that there is a vasoconstrictor substance in the serum of rachitic subjects. Rickets, tetany, and the exudative diathesis seem to be closely allied and frequently occur in the same patient. It is not uncommon to find tetany, laryngospasm, and eczema co-existing in the same rachitic child. Serum from such children caused vasoconstriction in the frog's vessels three or four times as great as that of normal serum. When well-marked tetany was present, the constricting power was greater than in cases of rickets or exudative diathesis alone. The nature of this vasoconstricting substance has not as yet been determined. It is possible that it may be an excess of adrenalin, which may be primary or due to some abnormality of the secreting glands.

Atrophic Infants. The value of a food depends in the broadest sense on two factors: (1) Whether or not it meets the requirements of the organization in furnishing sufficient energy and material for growth; (2) whether or not the food itself, or the substances derived from it in

¹ Medizin. Klinik, December 25, 1910.

² Bulletin de la Société de Pédiat., April, 1911.

³ Münch. med. Woch., August 1, 1911.

the process of digestion, exerts any deleterious action on the organism. Fundamentally associated with the first problem is the question of the absorption of the food in the gastro-intestinal canal. In our system of infant feeding, in which the percentage of protein, fat, and carbohydrate in the food is the criterion by which we judge of its suitability, and by which we modify the mixture according to the clinical manifestations, it is important to know whether the absorption of the different substances is influenced by the percentage relation of one to another. Very few observations have been made on this point. Fife and Veeder¹ report studies made in the metabolism of atrophic infants to determine the absorption of fat and carbohydrate, and the influence of the varying quantities of fat and carbohydrate on the nitrogen metabolism. The details of the experiments are described at length, from which the following conclusions were drawn: The fat absorption was less than in normal infants, although the infants were able to absorb large quantities of fat. The percentage absorption was better with a large amount of fat in the food than with low amounts. The amount of carbohydrate in the food did not influence the fat absorption. The amount of fat in the form of soaps in the feces was neither proportional to the amount of calcium in the feces nor to the amount of carbohydrate in the food. Both the actual and the percentage amounts of soaps were greater when the fat intake was low. The nitrogen retention was greater than in normal infants of the same age and weight. Increasing the amount of carbohydrate produced an increased nitrogen retention, but the nitrogen retention was not influenced by the amount of fat in the food.

Foundlings and Neglected Infants. The management of this class of unfortunate infants is the subject of an interesting paper by Chapin, who has made an extensive study of the subject, and was largely instrumental in forming the Speedwell Society. The object of the society is to save neglected infants by boarding them out among honest and responsible people in healthy country districts. The following features have been emphasized in his work: (1) Boarding out in a certain district of the country noted for its healthful conditions. (2) Constant attention to diet and hygiene on the part of the doctor and nurse who are familiar with this class of cases and competent to deal with them. (3) The infants are kept as long as necessary, until feeding is regulated and digestion and assimilation are improved sufficiently to result in an increase in weight. The work is kept up during the whole year, and not limited to certain seasons. (4) The training up in a given neighborhood of a number of foster mothers, who, by constantly taking these infants into their homes, become expert in handling them under conditions totally unlike those offered by the best institutions and far

¹ American Journal of Diseases of Children, July, 1911.

superior to them. If the plan thus elaborated could be carried out generally in place of institutional work for feeble, neglected babies, a large majority of them would be saved. No capital is required to be tied up in a large building or plant. The plan has proved to be economically sound, as well as practically efficient. Further details of this work are contained in an article by Glazebrook,¹ and H. H. Hart,² of the Russell Sage Foundation, discusses the same general subject.

Hospitals for the Care of Infants and Children. An admirable series of articles on this subject by Koplik, Northrup, Huber, and Bell³ will prove of interest to every practitioner who treats children in hospitals. Koplik describes conditions in several European hospitals, and considers especially the prevention of infections in such institutions. Northrup considers ward improvements which have been made in the children's wards of the Presbyterian Hospital, of New York, and also discusses modern methods for prevention of the infectious diseases. Huber discusses the same subject, based upon an extended hospital experience. Bell presents an excellent paper on the pediatric service in general hospitals. He points out the inadequacy of that service in many of the general hospitals, largely because of the differences of the conditions which must be met. He points out that true pediatrics involves constant oversight of the child, while hospital ward service is incidental. This oversight is obtainable with a well-organized department under competent and constant medical direction, and in no other way. Visiting nurses service, welfare associations, and dispensaries should be, as far as possible, correlated or amalgamated with the pediatric service of the hospitals, which should have charge of the records and classify them for reference. Open-air wards are commended by an editorial writer⁴ for certain weak children.

Indigestion in Older Children. According to Griffith,⁵ the most frequent cause of digestive disturbance in older children is inability to digest carbohydrates. Any starchy food may give trouble, but potato is one of the most liable to do so. The giving of candies and other sweets, allowing the child to eat when it pleases between meals, in some cases an excess of fat in the food, and swallowing without sufficient mastication of the food are among the dietetic influences. The disease is common to children who receive food from the family table at too early an age, the majority of cases developing in children between the ages of three and ten years. As in infancy, the disease is a functional disturbance, no lesions of the intestines being present, except, perhaps, injection of the mucous membrane and an increased secretion of mucus.

In well-developed, typical cases, the symptoms are very character-

¹ Archives of Pediatrics, February, 1911.

² Ibid.

³ Ibid., September, 1911.

⁴ Ibid., August, 1911.

⁵ Ibid., May, 1911.

istic. There is loss of flesh, the limbs especially being thin, and the child having a delicate appearance, with an anemic or sallow complexion, dark rings or puffiness under the eyes, and perhaps, sometimes, a slightly yellowish tint to the sclerae. The appetite is variable and capricious and generally poor, although in some instances excessive. Eructation of gas is common as is its passage by rectum, and the abdomen is usually distended and tympanitic. This abdominal distention is one of the most characteristic symptoms. Nausea and vomiting may occasionally occur if the stomach shares in the dyspeptic condition, but, in some cases, vomiting and headache appear to attend upon intestinal toxemia. The tongue is pale, flabby, and perhaps tooth-marked; sometimes coated, sometimes exhibiting enlarged papillae. The breath is offensive in some cases. The condition of the mouth and tongue, however, depends largely upon associated gastric disturbance. Constipation may alternate with attacks of diarrhea. The color of the stools is generally pale and sometimes nearly white, at other times brownish. The passages are frequently offensive and contain undigested food. Mucus is passed at times, often in large amounts. Abdominal pain may or may not be present, but colicky pain is not uncommon. The hands and feet are prone to be cold. Sleep is restless, and there is frequently grinding of the teeth.

TREATMENT. The most important element in treatment is the *dietetic*. Too large an amount of food must be avoided and sufficient time for eating must be enforced. In bad cases it is sometimes necessary to almost completely eliminate starch. Potatoes should not be given in any case, and bread should be restricted. Cereals must be taken in restricted amounts, and sugars and sweets should be prohibited. Raw fruit should be interdicted, but baked apples, prune juice, and orange juice may be given in some cases. In most of these cases, fats in all forms must be avoided, and in severe cases skimmed milk may be necessary. Fried foods and pastry are to be rigorously excluded. A highly proteid diet is often one of the best. Broiled or roast beef, mutton, or chicken is usually well borne, in amounts depending upon the age of the child. For young children it should be scraped or minced finely, and this may be necessary for older ones as well, if thorough mastication cannot be successfully insisted upon. Beef juice is useful, although not very nourishing, unless in larger amounts than can be successfully given in most cases. Broth, with the meat fiber retained in it in finely divided form, is serviceable, but thickening with any starchy addition must be avoided early in the case. The fat should be thoroughly removed from the broth before it is eaten. The best of these proteid foods in the majority of cases is undoubtedly milk, which should form a large part of the diet. If there is difficulty in digesting the casein, the milk should be partially peptonized. Eggs form a valuable food for most children, but are not well borne by many others.

It is rarely advisable to allow them every day. Boiled fish is often useful, and oysters, raw or very slightly stewed, are well digested by some patients.

Useful vegetables in many instances are string beans mashed through a collander, spinach, squash, stewed celery, stewed salsify, asparagus tips, and lettuce. The time of beginning these varies with the age of the child and with the necessity of finding some food to take the place of the articles which are forbidden. When possible, their administration should be deferred for some months in all severe cases. A diet list for cases of chronic intestinal indigestion, in which a certain amount of starch is permitted and in which milk and eggs are permitted, would read somewhat like this, varying, of course, with the age and individual requirements:

Breakfast, 7 A.M. Milk with lime water; soft boiled egg or mutton chop; fish or cold beef; a slice of bread without butter, zwieback, or water crackers, or similar unsweetened biscuit.

Lunch, 11 A.M. Milk or broth free from fat.

Dinner, 2 P.M. Roast or broiled chicken; beef or mutton free from fat, or sweetbread; spinach, string beans, stewed celery, stewed salsify or asparagus tips; bread or crackers as at breakfast. For desert, junket, baked apple, prune pulp, or gelatin foods with little sugar.

Supper, 6 to 7 P.M. Milk, buttermilk, or broth; with bread as at breakfast.

An excellent article on the same subject is contributed by Bogart,¹ of Schenectady. In 36 of his cases in which test was made for indican, it was found in marked excess in 24. In the treatment, he advises particularly against the use of sugar.

Gastric Disorders in Infants. In a brief article on the *dietetic management of the gastric disorders of infants*, Hand² asserts that the normal gastric juice of infants contains hydrochloric acid and three ferments—lipase, rennet, and pepsin. Slight disturbances are sufficient to diminish or suppress the hydrochloric acid, especially in the presence of mucus; hyperhydrochloria may, however, occur in infants as well as in adults. The total acidity is increased by the action of the ferment lipase, splitting the fats into fatty acids, and, if there is motor insufficiency, symptoms of fat indigestion are apt to arise. Pepsin in the stomach of young infants has very little time to do its work; the milk must be curdled, the curd must swell through the action of hydrochloric acid, and the pepsin must then dissolve it and convert it into albumoses, propeptones, and peptones, a process which requires considerable time for its completion. The infant's stomach should normally be empty in an hour and a half after feeding. There is the temptation to say, therefore, that gastric peptonization is comparatively unimportant. But it is very probable

¹ New York State Journal of Medicine, March, 1911.

² Archives of Pediatrics, August, 1911.

that even this incomplete digestion renders the pancreatic digestion in the small intestine all the more complete. The important ferment of the infant's gastric juice is undoubtedly rennet, and it is by guiding the action of this ferment that much is accomplished for good or ill in our attempts to nourish infants on the bottle. In difficult cases, Hand has often resorted to whey or buttermilk. He prefers the latter made of skimmed milk and fermented with the compressed tablets of the Bulgarian bacillus. These give the digestive organs considerable rest, and at the same time introduce enough nourishment to sustain life for a little while. They may be immediately or gradually supplanted by other mixtures; by adding cream to the whey, or fermenting the whole milk, or the feeding may be alternated.

The *value of gastric analysis in the digestive disturbances of infancy* is the subject of an article by Woodclark.¹ He states that the physiological activities of the infant's stomach are those of the adult in miniature. In other words, all of the functions of the adult stomach appear in the infant, but in a diminished degree. Hydrochloric acid, pepsin, and rennet may all be found in the stomach of the newborn infant, but are much less concentrated than in the grown man. In the newborn child, if fed on woman's milk, the stomach empties itself in from one to one and one-half hours. As the child grows older, the time becomes prolonged. In 1907 Woodclark was appointed to the staff of the Rockefeller Institute and undertook a long series of investigations into a twofold problem—the exact action of such milk modifiers as lime water, barley water, and sodium citrate on gastric secretion and digestion, and the value of a test meal and gastric analysis in the diagnosis and treatment of the digestive disturbances of infancy. Since the appearance of the report on this work² there have been published a number of articles by American and foreign observers working along the same line. The writer gives a review of the work of these observers and describes the technique to be employed. He believes, as a result of these studies, that a suitable test meal properly used may prove in time to be an aid of very considerable value in the treatment of certain of the digestive disorders of infancy. Before its actual worth is proved, however, a large amount of investigation and practical application of the result on ill children will be necessary. The individual variations in the infant are far greater than in the adult, and the correct interpretation of the results is, therefore, proportionately more difficult. The most important features in the investigations which are to come must be uniformity—uniformity in method, in the test meal, in time, and in the method of analysis. The test meal, as applied to the newborn child, is in itself in its infancy. If it is to become a useful member of the medical curriculum, it must be nurtured carefully, and developed

¹ Archives of Pediatrics, August, 1911.

² American Journal of the Medical Sciences, 1909.

systematically, that it may in time prove a boon in the hour of pediatric dietetic doubt.

After an extended experimental study on the *food reactions in the infant's stomach*, Cowie and Lyon¹ conclude that: (1) The infant's stomach secretes all the digestive juices from the first day of life. (2) Free hydrochloric acid rarely occurs in the infant's stomach during the early part of the day. It may be found in the fasting stomach, at the height of digestion, or at the end of the digestive period. (3) The evacuation of the normal infant's stomach depends, to a large extent, upon the degree of acidity of the stomach contents. Excessive acidity delays evacuation. A total acidity value varying from 8 to 30 offers the normal stimulus for pyloric relaxation. (4) Basic calcium casein does not inhibit the formation of rennet curds in the infant's stomach. It delays the formation of curd, delays the saturation of the proteid with acid, delays the acid pyloric reflex, and by so doing delays the evacuation of the stomach contents. The action of rennet on basic calcium casein in the test-tube is not comparable with that which takes place in the stomach, as the conditions are not the same. (5) Sodium citrate inhibits the action of rennet in the stomach as well as in the test-tube. The curd formed in the stomach and that formed when dilute acid is added to citrated rennet milk are casein hydrochloride curds. (6) The curds normally present in the infant's stomach are paracasein hydrochloride.

After studying the *relationship of gastric and pancreatic fat digestion in infants*, Sedgwick and Schlutz² feel warranted in concluding that the neutralization of the fat gastric digestion does not end the function of the gastric lipase of the dog or infant. Whether the effect shown is the summation of, or a relationship between, the actions of the two ferments, their results do not permit them to state with certainty. It seems justifiable, however, to conclude that the function of the gastric lipase of the infant is not ended when the gastric contents pass the pylorus and are neutralized in the duodenum.

Spasm of the Pylorus in Infancy. A large number of articles on hypertrophic stenosis and spasm of the pylorus in infants has appeared during the last year. An excellent paper by Morse³ presents the differential diagnosis between these two conditions. While spasm of the pylorus and congenital hypertrophic stenosis are two distinct conditions, the diagnosis between them is extremely difficult at times. The onset of the symptoms is the same in both, the vomiting is explosive in both, and there is visible peristalsis in both. Constipation and loss of weight are common to both. There is sometimes a palpable tumor in spasm; the tumor is sometimes not palpable in hypertrophic stenosis.

¹ Archives of Pediatrics, February, 1911.

² American Journal of Diseases of Children, October, 1911.

³ Ibid., May, 1911.

The constipation is never so marked or persistent in spasm as in stenosis, and the tumor in spasm is small and cord-like, not large and hard as in hypertrophic stenosis. Variation in the size of the tumor during the examination is practically positive proof that the condition is one of spasm and not of hypertrophy. The difficulty in diagnosis comes between the severe cases of spasm and the mild cases of hypertrophic stenosis, because the difference in the symptomatology is in the degree, not in the kind of symptoms.

In many cases it is impossible to make a positive diagnosis. If the baby is breast-fed, the chances are much in favor of hypertrophic stenosis. If the baby is artificially fed, the chances are even, although, if the feeding has been very rational, spasm is a little the more probable. The absence of a palpable tumor is strong evidence against hypertrophic stenosis, but does not positively exclude it. It is never safe to conclude that there is no tumor unless the abdomen has been examined with the stomach both full and empty and with the abdominal walls relaxed, if necessary under an anesthetic. If no tumor is felt under these conditions, an almost positive diagnosis of spasm is justified. Examination of the gastric contents is of little or no assistance, because there is very little reliable data as to the chemistry of the gastric contents in these conditions. An excessive hyperacidity perhaps counts a little, however, in favor of spasm. Dilatation of the stomach seldom develops in simple spasm. It develops in a certain proportion of the cases of hypertrophic stenosis, but is seldom extreme. Its presence is, therefore, in favor of hypertrophic stenosis and against spasm. Dilatation of the stomach, unless extreme, is very difficult of demonstration in infancy. Too much importance must not be attached, therefore, to what are apparently slight degrees of dilatation. Rapid improvement under medical treatment and regulation of the diet is strong evidence in favor of spasm, but does not positively exclude a mild degree of hypertrophic stenosis complicated by spasm. The most important points in favor of spasm in doubtful cases are, therefore, the absence of palpable tumor, or, if a tumor is present, its cord-like feel, the presence of intermittent contraction and relaxation of the tumor, and rapid improvement under medical treatment and regulation of the diet.

The *etiology of spasm of the pylorus in infancy* is very obscure. It is apparently most common in excitable and irritable infants, the offspring of neurotic parents. Others believe that disturbance of the gastric digestion always precedes and causes the spasm. Some observers have found a hyperacidity of the gastric contents, others have not. Engel believes that a gastrosuccorria is at the bottom of the trouble. It is safe to conclude, in view of the conflicting opinions and the insufficiency of the data, that nothing is known as to the etiology, which is sufficiently reliable to serve as a basis for treatment.

TREATMENT. The most important part of the treatment of pyloric spasm is regulation of the *dict*. The best food is good breast milk. If this is vomited, it is well to remove a part of the cream and add lime water. The next best food is some modification of cow's milk. It is advisable to keep the percentage of fat low, because fat tends to delay the emptying of the stomach. It is also advisable to give as large a proportion of proteids as possible in the form of whey proteids, because they are not coagulated by rennin and easily pass the pylorus. An alkali should be added to the milk to neutralize any possible part of the hyperacidity and to delay the coagulation of the casein by rennin and thus favor the passage of the liquid milk through the pylorus. Plain whey is very useful in some instances; so also is pancreatization in others. There is much difference of opinion as to whether the food should be given at short or long intervals and as to the quantity which should be given at a feeding. The most rational way of regulating the intervals between the feedings is to determine how long it takes the stomach to empty itself in the individual case and to make the interval somewhat longer than that is. In general, it is probably better to give smaller amounts at a feeding, although there are many exceptions to this rule. Daily lavage with plain water or a weak solution of bicarbonate of soda is of assistance in most cases, although some authors think that it tends to keep up the spasm. Warm applications to the epigastrium are sometimes of assistance. Minute doses of some preparation of opium—for example, one-fortieth of a minim of the tincture—given a short time before feeding, sometimes seems to diminish the spasm. Atropine and cocaine have also been used for the same purpose. It is also important to keep these babies very quiet, especially immediately after feeding.

Surgical interference for the relief of spasm is seldom either necessary or advisable. Carpenter compares it to tracheotomy for laryngismus stridulus. This comparison is, however, a little too strong, because experience has shown that babies sometimes die of this condition under medical treatment. Surgical intervention is, therefore, justified in certain extreme cases. An exploratory laparotomy certainly ought to be done in all cases in which there is a reasonable doubt as to whether the condition really is one of spasm and not of hypertrophic stenosis, and in which the patients are doing badly under medical treatment.

Intestinal Indigestion in Early Life. In discussing this important subject, Griffith refers to the researches of Finkelstein,¹ which have recently aroused so much interest. If his theories shall be proved to be correct, they go far toward revolutionizing the theories of the nature of chronic indigestion in infancy. We have long regarded bacteria as an active cause in this condition. That they are so is undoubtedly true to some

¹ Archives of Pediatrics, May, 1911.

extent, but these organisms would appear to act not so much by producing an infection as by an intoxication through the products of their growth; while in very many cases it cannot be seen that the bacteria have any action whatever except a secondary one, namely, the causing of decomposition of food, the absorption of which indigestion has already prevented. The primary element in chronic indigestion, according to these views, is a fault in the secretory and absorbing power of the intestine, often with a resulting intoxication from chemical poisons produced. The disease is a disturbance of the digestive process, not a direct bacterial disease. Furthermore, the poisonous products are by no means always produced in the intestine itself, at least in the later stages, but may be the result of faulty metabolic processes in the tissues, depending originally upon the faulty digestion. It is in this way that we must explain, according to Finkelstein's views, the advanced stages of infantile atrophy, in which, in spite of no apparent disturbance of the digestive process in the stomach or intestine, there is still a progressive loss of weight until death takes place.

In some cases there is constant diarrhea, the stools being watery, greenish, and containing curdy masses of various size and often mucus. In other cases the stools are only occasionally of this nature; or there may be a chronic constipation, the stools often being pasty and too light in color, and sometimes hard, either in small scybalous masses, or in larger form with difficulty in evacuation. In any event, microscopic and chemical examination often reveals undigested food, especially fat-free or in the form of soap. The frequency of the presence of undigested proteid matter in the stools is much disputed, but experience would indicate that the whitish masses are seldom protein matter to any considerable extent. Vomiting occurs occasionally, but is not a troublesome symptom unless the disease is complicated by gastric indigestion. The abdomen is usually distended by gas, and there is frequent colic. The appetite is generally good and sometimes large. There is often irregular fever alternating with low temperature. It is only when constitutional intoxication develops that fever is constant. The urine may show the presence of acetone.

TREATMENT. The medicinal treatment is purely symptomatic. The hygienic treatment is important and will accomplish considerable. By far the most important treatment, however, is dietetic; and this is frequently one of the most difficult problems which the physician encounters. The first thing necessary is a very careful study of the previous history, in the effort to determine what element of food or fault in its preparation has originally produced the disease, or has maintained it. Then a moderate starvation of twenty-four hours or longer should be enforced. For this purpose some cereal decoction, such as barley water, is of service. As very often it seems likely that both fat and casein are not easy of digestion, the employment of whey

is frequently serviceable. When there appears to be a special intolerance of butter fat, as shown by the frequent sour vomiting or by the discovery of an excess of fat in the stools, the whey may be made of skimmed milk. But whey, even with the addition of sugar, is a weak food, not containing sufficient calories to enable a child to thrive long. This, at least, is the theory. Nevertheless, many children improve in health on it and gain weight for a considerable time. If whey has agreed, but it has become evident that a stronger food is desired, an addition to it must be made. When it appears that the difficulty has been with the digestion of casein and that fat is well borne, small amounts of cream may be added. Buttermilk is of great value in many cases, especially when there is difficulty in the digestion of fat.

Freeman¹ reports cases of intestinal infantilism of Herter, and believes the condition is not very infrequent in young children, who for a considerable period will not grow or gain in weight, although their management may be most perfect.

Mucomembranous Colitis in Children. This condition, according to Arraga,² is very common among young children in Argentina. He regards it as a manifestation of an arthritic or rheumatic tendency, often inherited. When it is marked, the earlier symptoms are green bowel movements alternating with constipation. If established in childhood, the tendency to alternating colitis and constipation may continue through life. Arraga believes that a diet overabundant in meat and eggs has much to do with the production of this condition. If such a diet is not sufficient to generate the disease, it may aggravate an inherited tendency. Children showing this tendency, he believes, should be nursed as long as possible, and the mother should subsist as largely as possible upon a diet of milk and vegetables. Eggs and meat should be used sparingly by both mother and child.

Exudative Diathesis. Considerable is being written upon this subject, particularly in Germany. The exact meaning of the term is not quite clear, as different writers differ in their conception of the condition. Pflaunder³ speaks of it as a neurolymphatic tendency, and holds it to be a soil upon which "scrofulous" symptoms develop. The chief preventive measures are suitable hygienic management, an outdoor life, companionship with other children, and especially a diet which excludes animal food almost entirely. He disapproves of milk, cream, butter, and eggs in such cases. He also condemns the use of sugar. Children often rebel against a vegetable diet, but will learn to take it if all animal food is rigorously denied them. In cases of extreme anorexia, Pflaunder uses the device of urging for a time by threats, rewards, or persistent attempts to force the child to take small

¹ American Journal of Diseases of Children, November, 1911.

² Archives de Médecine des Enfants, December, 1910.

³ Therapeutische der Gegenwart, August, 1911.

quantities of food, and then ceasing all efforts suddenly and letting the child alone. This he asserts is often very effective.

Eosinophilic Intestinal Crises in Young Children. A condition is described by Langstein,¹ marked by profuse discharge from the bowels of mucus and pus in which large quantities of eosinophile cells are found. As no infectious disease of the bowels is present, it has been thought that this condition might be due to what Czerny has called the exudative diathesis. Since the report of those cases the author has studied numerous cases of mucopurulent diarrhea in infants to ascertain the frequency of the occurrence of eosinophile cells. He has found the condition much more frequent than he had anticipated, and believes it an early stage of the exudative diathesis of Czerny. He describes what he regards as a typical case, that of an infant of five weeks in which facial eczema appeared. A few days after its appearance large mucopurulent discharges began to occur, in which large numbers of eosinophile cells were found. After a few days these discharges ceased suddenly. During their occurrence the eczema became worse, but there was no rise in temperature. Examination of the blood showed an eosinophilia of 8 per cent. As the writer believed that alimentary as well as contagious disease could be eliminated from consideration, he regarded the bowel condition as an exudative diathesis, and made no change in the diet except to reduce it somewhat in amount. He asserts the belief that the presence of these cells in the stools is of diagnostic value and may act as a guide in feeding. It is not necessary to resort to a reduced diet, as in the ordinary infectious diseases of the bowels. The prognosis would also seem to be better.

Infant Food. In a paper on the *role of mineral salts in the metabolism of infants*, Hoobler² reports investigations upon the part which mineral salts may play in carrying on the physiological functions of the body and the part they contribute to the various pathological processes to which the infant is subjected. After thirty pages or more of data, he concludes that: (1) Salts are necessary to maintain life. (2) They are best utilized when in organic combination with foodstuffs. (3) There are marked differences in the food content of mother's and cow's milk which should be considered in artificial feeding. (4) Certain conditions arise in which certain of the salts are not absorbed. (5) In certain other conditions, salts are actually withdrawn from the body to such an extent as to impoverish the organism and produce grave disturbances of nutrition. (6) The various salts, with the exception of iron, are present in sufficient quantities and proper proportions in mother's milk. In most of the dilutions of cow's milk there is an excess of salts which may be neglected in feeding normal infants, but which plays an important role in the feeding of children suffering from

¹ Münch. med. Woch., 1911, vol. lviii.

² American Journal of Diseases of Children, August, 1911.

nutritional disturbances. The conditions under which the salt content should be altered are still unsolved problems.

Basing his opinion on extensive observations, Cobliner¹ asserts that the kidneys of young children are more easily irritated than are those of adults. When large amounts of salts are administered, they are not rapidly eliminated. Retention results and edema sometimes occurs even in healthy children. It would seem possible that this might explain the occurrence of edema in children who otherwise appear normal.

Studies on *milk sugar* made at the Rush Laboratory are reported by Helmholtz.² He found that a slight overstepping of the sugar tolerance will lead to a condition marked by a slight drop in weight, an increased number of bowel movements, and a slight rise in temperature. Gross increase above the tolerance or rapid lowering of the tolerance by heat, infection, or toxins gives rise to typical cases of cholera infantum characterized by coma, rapid drop in weight, watery stools, fever, slow toxic breathing, leukocytosis, albumin, casts, and sugar in the urine. The normal infant can handle from 2 to 3 grams of lactose per kilogram of body weight. If more is given, the child will excrete lactose in the urine. In intoxications, the tolerance for lactose is greatly reduced; even when as small an amount as 5 c.c. of mother's milk is given at a time the urine may show a decided reaction for sugar. This is explained by the assumption that the intestinal lining has been so changed that the sugar, instead of being split, as normally, is rapidly absorbed and excreted through the kidneys. The normal permeability of the intestinal mucosa has been so changed that other toxic products may be absorbed. Comparatively recently Leopold and Reuss have made the observation that when lactose is injected subcutaneously into infants and dogs, there occurs a quantitative excretion in the urine, if only a single dose is given. If the injection is repeated daily, the amount of lactose which appears in the urine falls, until, finally, no lactose at all is excreted by the kidneys. It has been hinted that the gradual increase of tolerance for lactose so administered is analogous to the development of immunity by repeated doses of a true toxin. Clinically, excessive amounts of lactose may cause a chain of symptoms, namely, fever, diarrhea, leukocytosis, prostration, and death, which closely resemble the effects which follow the absorption of certain true toxins. Experimentally, too, it is possible to show that lactose fed in excess to pups will cause a similar picture.

The *influence of sugar upon the intestinal flora* is studied by Hartje.³ It has been clearly demonstrated that sugar plays an important part in the formation of acids in the intestinal tract through bacterial action.

¹ Jahrbuch für Kinderheilkunde, 1911, vol. lxxiii.

² Archives of Pediatrics, May, 1911.

³ Jahrbuch für Kinderheilkunde, 1911, vol. lxxiii.

The studies of the author seem to show that milk sugar and malt extract favor the growth of the acidophile organizations. They soften the bowel contents and make them more sour and lower the normal processes carried on in the bowel, so that but little, if any, indican appears in the urine. To secure the typical feces of the breast-fed child, milk sugar or malt extract should be administered.

After a study of *sugars in infant feeding*, Leopold¹ believes that equal parts of maltose and dextrin is the sugar preparation best borne by infants. He found that it caused dyspeptic stools and rise in temperature much less frequently than either lactose, saccharose, glucose, or maltose. Moreover, a gain in weight was obtained in a greater number of cases under its use than by any of the other sugars.

MILK AS AN INFANT FOOD. The *relation of milk to infant mortality* is the subject of a paper by Professor Conn,² who asserts that all dangers in milk are connected with its bacterial content. Milk is not necessarily harmful because it contains large numbers of bacteria, for buttermilk is known to be good, and it has millions of germs in it. But the presence in milk of certain bacteria—those of tuberculosis, typhoid fever, diphtheria, and scarlet fever—constitutes a great danger. Certified milk is beyond the means of the masses. Pasteurization, properly performed, comes nearest to the solution of the milk problem. This is to keep the milk at 140° F., not higher, for one-half hour. This does not change the digestibility of the milk, yet it destroys all pathogenic bacteria.

W. H. Park,³ of the New York Health Department, in an extended paper on the *bacteriology of milk*, states that tuberculosis, typhoid fever, scarlet fever, diphtheria, and tonsillitis are the chief diseases transmitted by milk. Measles is apparently not conveyed. The tubercle bacilli are in the majority of cases derived from the cow, but may come from human sources; the typhoid bacilli are derived entirely from man; the contagion of true scarlet fever in milk is probably always from man. Diphtheria bacilli are probably always of human origin. Basing his opinion on extended observations, Park concludes that something over 1 per cent. of deaths from tuberculosis are due to bovine bacilli. In little children, probably fully 10 per cent. of deaths from tuberculosis are from bovine bacilli. As knowledge of the connection between milk-contained bacteria and disease has become considerable, it is known that children are subjected to many dangers which do not come to adults. This has led the Board of Health of the city of New York to separate milk used by children from the general supply. After January, 1912, the following varieties of milk will be distributed in New York City: “(1) Milk for infants sold in bottles or sealed containers—(a) raw milk which has been certified to, or the

¹ Archives of Pediatrics, October, 1911.

² Ibid., September, 1911.

³ Ibid., August, 1911.

equivalent; (b) a grade just below, an inspected milk, either from tuberculin-tested cows or pasteurized at a temperature of from 140° to 150° F. for a minimum of twenty minutes. (2) Milk for adults from ordinary farms shipped under ordinary conditions but pasteurized very carefully. (3) Milk which can be used for cooking purposes. This is from the poorer farms, where only the simplest precautions are taken." This separation of milk is intended to concentrate effort on the portion of the milk that requires it and does not raise the cost of producing any grade beyond that believed to be necessary.

The important subject of *milk depots* is considered by Hermann,¹ of New York. As at present established, they may be divided into two groups—(1) those which simply distribute milk, and (2) those which, in addition to the distribution of milk, have medical supervision of the infants under their care. The first type are of little or no value. They may be positively harmful by diminishing the number of breast-fed infants. The second type is the usual one. The writer's conclusions, based on an extensive experience, are: (1) Premiums to nursing mothers are unnecessary. The results do not justify the expenditure. (2) Depots which simply distribute milk are of little or no value. (3) The visiting nurse is essential in order (a) to keep the mother and child together; (b) to get the infant at the start; (c) to keep the infant at the breast; (d) to give individual instruction in the quiet of the home. (4) It is not necessary to distribute modified milk at the depots. From 75 per cent. to 80 per cent. of the mothers can nurse their infants for five or more months if properly advised and encouraged from the start. Modification is taught the mother by the visiting nurse when artificial food is necessary.

The *influence of milk stations in reducing infant mortality* is shown in positive manner by an excellent series of papers by Pisek, Baker, Lederle, Evans, Chapin, Holt, Northrup, and Jacobi.² In the summer of 1911, a concerted effort was made by all the public and private milk stations in New York, with the result that there were 1244 less infant deaths during the four hot months than in the preceding year, and 1417 less than the average of the previous five years. In localities not supplied with stations, the death rate was heavier than last year. This was true of most cities in this country and Europe, for the summer was a hot and an unusually trying one. The stations were nearly all of the second type described by Hermann, that is, the infants not only received milk, but were under the supervision of physicians and nurses. The results were most positive and satisfactory.

BREAST FEEDING. An interesting study on the late effects of the various modes of feeding during infancy is reported by Comby.³ The

¹ Archives of Pediatrics, June, 1911.

² Medical Record, October 21, 1911.

³ Archives de Médecine des Enfants, February, 1911.

object was to determine the influence of early feeding upon later development. The cases observed were divided into three classes: (1) Those children fed by wet-nurses; (2) those artificially fed; (3) those nursed by their mothers. In the first class, 36 per cent. were above normal height when fully grown, 50 per cent. in the second class, and 70 per cent. in the third. It is interesting to note that 70 per cent. of the children fed at the breast from six to ten months developed well in later years, 68 per cent. of those fed from ten to thirteen months, and only 60 per cent. of those nursed for longer periods. The *possibilities of maternal nursing in the prevention of infant mortality* is the subject of a paper by Southworth,¹ who points out the undeniable fact that artificial feeding is increasing and breast feeding is decreasing. He makes out a strong case in favor of possibilities in the direction of prevention of infant mortality through the agency of maternal nursing. Schwarz² quotes statistics which show that deaths due to diarrhea and enteritis in the registration area were 113 per 100,000 inhabitants for the years 1900 to 1904, and had increased to 118 per 100,000 inhabitants from 1905 to 1908. In the rural parts of this registration area, where breast feeding is diminishing more rapidly, this increase in mortality has been greater, going from 73 to 93 per 100,000.

A *plea for breast nursing* is made by Frost,³ who refers to the enormous death rate among infants and the decreasing birth rate. He asserts that the chief requisite for successful pediatrics is the education of the mother. The *modification of the mother's milk* is the subject of a paper by Baughmen.⁴ This is to be accomplished by general exercise, massage, and regulation of the diet. He asserts that the best stimulant for the whole lacteal secretion is proteid food. The nitrogenous foods stimulate more particularly the production of fats. The advantages of breast feeding in institutional infants are shown in an excellent report by Pritchard, Carter, and Pitt.⁵

Complemental feeding of the infant as an effective aid in maintaining maternal nursing is strongly urged by Southworth,⁶ who asserts that a small amount of breast milk is vastly better than none. Although in a few instances the mother's milk seems to have a laxative effect on the child, Malony⁷ strongly advises against weaning. In many cases, irregularity and overfeeding are causes of the difficulty. In studying the albumin elements of human milk, Grosser⁸ believes that the beneficial influences of human milk does not result from any pecu-

¹ American Journal of Obstetrics, January, 1911.

² American Underwriter, December, 1911.

³ New York State Journal of Medicine, August, 1911.

⁴ Pediatrics, February, 1911.

⁵ Lancet, September 2, 1911.

⁶ Journal of the American Medical Association, February 4, 1911.

⁷ Practitioner, February, 1911.

⁸ Jahrbuch für Kinderheilkunde, 1911, vol. lxxiii.

liarity of the proteid element, but from some soluble element in the whey which is not precipitated by known methods. Engel and Turnau¹ asserts that when fifteen or twenty drops of a 2 per cent. solution of nitrate of silver are added to 5 c.c. of urine, a black precipitate forms if the infant is breast-fed. When the infant is bottle-fed, there is no such precipitate. The practical meaning of this peculiar reaction is not explained.

The question as to *whether eclamptic mothers should nurse their newborn infants* is considered in a prolonged article by Goodall.² He believes, from his study, that answer is easy. In a mother profoundly toxemic and jaundiced, it is well to feed artificially for a few days, and have the breasts pumped dry once or twice after the maternal toxemia has improved and before the child is allowed to nurse. If the maternal convulsions come on *post partum*, allow the maternal elimination to go on until she is freed from the greater part of her toxemia, and then empty the breasts before allowing the child to nurse. If the albuminuria persists, it will be well to feed artificially throughout.

Experiments to determine the *action of animal extracts upon the secretion of the mammary gland* are reported by Ott and Scott.³ Their observations were made upon goats, and showed that infundibulin started the flow in about one minute from the beginning of the injection, and reached its height in four minutes, after which it rapidly fell to normal. They also found the corpus luteum, pineal body, and the thymus increased the quantity of milk fourfold in five minutes. The ovary minus the corpus luteum had no effect. The amount of butter fat was about the same in the augmented secretion by the thymus, corpus luteum, and infundibulin. Boiled thymus had no effect on the secretion of milk.

ARTIFICIAL FEEDING. The literature of artificial feeding during the last year has been exceedingly meager, more so, perhaps, than in any year for a decade. More has been written upon the "*eiweissmilch*" of Finkelstein and Meyer⁴ than upon any other subject. The authors themselves present a further report upon the use of this food and call particular attention to the fact that it is a food for sick infants, not for the well. It should be given alone and should not be combined with other milk or any other food. Grulee⁵ quotes the authors in giving the reasons for devising the food. The sugar is to be regarded as the essential and primary fermentation substratum. The fat can only take part secondarily, and then it is dangerous in the sense of acid fermentation only. The fermentation of the sugar is dependent on various

¹ Berliner klinische Wochenschrift, January 2, 1911.

² Archives of Pediatrics, January, 1911.

³ Therapeutic Gazette, October, 1911.

⁴ Münch. med. Woch., February 14, 1911.

⁵ American Journal of Diseases of Children, September, 1911.

factors: First, whether the whey concentration is more or less suitable for the intestine. In the second place, on the proportion of the casein content in the mixture to that of sugar. In endeavoring to combat the dyspeptic fermentations, the following principles are necessary in the preparation of the food: Reducing the quantity of milk sugar; diminishing the salt by diluting the whey; enriching the casein with a changing, but not unmarked fat content; and after improvement is attained, the addition of a carbohydrate easy to assimilate and hard to ferment.

In the cases reported in Grulee's article, the albumin milk was prepared in the following manner: (1) Buttermilk: The original culture was made from lactone and the succeeding one by inoculation of new milk from a milk culture already twenty-four hours old; it was found advisable to run parallel cultures, since at times the original culture would spoil and produce a buttermilk which could not be used. (2) The curds: These were produced by adding a teaspoonful of chymogen to a quart of boiled milk, which was then allowed to stand one hour at about 40° C. and then drained through a sterile cheese-cloth bag for one and one-half hours; the curds thus obtained were put through a collander twice. (3) Mixing: The curds were then mixed with a pint of buttermilk and water added to make one quart, and the whole beaten thoroughly in a small churn.

The albumin milk should appear much as does ordinary milk, except that when the bottle is slightly slanted, fine milk clots will be seen adherent to the glass. The difficulties in the manufacture of this food are many. The milk after preparation must be cooled and kept cool until time for use; it should not be transported over long distances, but, above all, in warming the bottle preparatory to giving the food to the baby one must heat it only enough to take the chill off the food.

In a paper on the *use of malt sugar and high percentages of casein in infant feeding*, Morse¹ said that Finkelstein and Meyer believe that the diarrheal diseases of infancy originate in functional weakness of the intestines, and that this weakness is kept up by fermentation. If this is the case, the first step in treatment is to stop the fermentation. This has been done in the past by cutting down the amount of food and giving a food not susceptible to fermentation. Fat, sugar, and proteid were all susceptible to fermentation. Meyer and Finkelstein conclude that casein has an antifermentative action. Morse expressed himself as not prepared to accept this doctrine for treatment of all disturbances in infants accompanied by diarrhea. They have made a strong argument against sugar as a factor in fermentation. The treatment of fermentation by a food low in sugar and high in proteid is, therefore, rational. The substitution of dextrine-maltose

¹ Medical Record, September 2, 1911.

mixtures for lactose also seems rational. One may take advantage of what is best in this plan of treatment, and at the same time avoid the disadvantages of a routine food and the superfluous buttermilk. By the use of cream containing a high percentage of fat, it is possible to reduce the amount of unprecipitated casein to a very low percentage. The precipitated casein was prepared according to the method of Finkelstein and Meyer, the casein from one quart of milk being made into an emulsion with sufficient water added to make one pint. This method of treatment was tried only in cases of intestinal disturbance associated with indications of fermentation and in which there was none or little vomiting. Morse expressed himself as convinced that this method of treatment of intestinal disturbances associated with fermentation by the withdrawal of lactose and by raising the percentage of casein, followed by the addition of dextrin maltose, is a valuable one.

In discussing this subject, Koplik¹ said that if they were going to talk about Finkelstein's method, they should follow out his methods exactly. As soon as they modified the method it was no longer his. He agreed that it was one food to fit all cases and was too much a routine method. Jacobi pointed out that the method has several advantages, little fat, little milk sugar, and more of other carbohydrates. Some have followed this method for fifty years. Freeman said that children would not gain much on Finkelstein's method unless more sugar or fat was added. Holt thought they could hardly call it a low-fat food, as it gave 3 per cent. fat. A year's experience with the use of eiweissmilch is reported by Welde,² who speaks in the highest terms of it when applied to suitable cases.

A ready *method of calculating milk formulas and their caloric value* is presented by Holt,³ who asserts that the more recent experience in infant feeding has shown the practical advantages of using at times milk mixtures containing relatively low fat and high protein, and the need of some ready method of calculating such formulas with approximate accuracy. The use of top milks containing various percentages of fat make it easy to secure formulas containing higher fat than protein and also to increase the fat without raising the protein. The utility of such formulas has by no means ceased; but they need to be supplemented by others in which the percentage of fat is lower than that of the protein, and in which also the percentage of protein can readily change, while the fat remains the same.

Of the various food elements, fat has received the most attention from writers during the last year. A long article on the physiology and

¹ Medical Record, September 2, 1911.

² Therapeutische Monatshefte, February, 1911.

³ Archives of Pediatrics, September, 1911.

pathology of the *digestion of fat in infancy* is contributed by Talbot,¹ of Boston, together with an extended bibliography. Douglass,² of Boston, writes upon one of the *difficulties of feeding fats to infants*. He warns against increasing the fats to secure a laxative effect, and asserts that there is no element of food which so completely checks the growth and development of an infant as fat does when imperfectly digested. Imperfect digestion of fat is shown by variable and lessened appetite, gassy condition of the stomach and bowels, disturbed sleep, pale-yellow color of the skin, tendency to vomit from one-half to one hour after feeding, offensive odor of the stools, their pale, greasy, rancid-butter, or dry, crumbly appearance, and by failure of the infant to grow. The *caloric needs of premature infants* is the subject of an elaborate article by Hess,³ of Chicago. He draws numerous deductions from his observations, from which he formulates rules for caloric feeding at various periods after birth and for various weights, which lack of space forbids reproducing.

¹ American Journal of Diseases of Children, March, 1911.

² Journal of the American Medical Association, February, 1911.

³ American Journal of Diseases of Children, November, 1911.

RHINOLOGY AND LARYNGOLOGY

BY D. BRADEN KYLE, M.D.

THE NOSE

Vasomotor Disturbances of the Nose. In discussing this subject, Richardson¹ calls attention to the increasing number of perennial types of vasomotor disturbances of the upper air tract; that is, the types of vasomotor affections which may be manifest at any period of the year, having no certain period of onset and no exact time of cessation. These types manifest themselves whenever the source of irritation is most active, and endure in varying degrees of intensity as the source of irritation is present. He groups them according to the character of symptoms displayed and the changes manifested in the turbinal tissue, as follows:

(a) A type of vasomotor disturbance that appears in paroxysms, being attended with congested turbinals; obstructed breathing, moderate in the daytime, almost or quite complete at night; violent paroxysms of sneezing; copious serous discharge from the nose. This type usually lasts from a few days to a week, and is generally followed by a complete period of relief, until another paroxysm develops. Sufferers from this type usually designate their condition as a "cold."

(b) A more or less constant type of vasomotor turgescence of the nasal mucosa. This is characterized locally by a relaxed sodden condition of the turbinal tissue, which is very much paler than normal. Nasal breathing is very much impaired at all times during the day, complete obstruction being present at night. Violent paroxysms of sneezing occur usually in the morning and frequently throughout the day.

(c) A more or less constant type of vasomotor catarrh, in which the symptoms are most frequently manifested at night, although paroxysms may occur during the day. In this type there is also, in connection with the vasomotor turgescence of the turbinals, a similar disturbance in the bronchial mucous membrane. The turbinal congestion is very florid. The obstacle to nasal breathing is apt to be paroxysmal during the day, and usually occurs at night during the early morning hours. Sneezing is usually manifest when the breathing is markedly obstructed.

¹ Laryngoscope, August, 1911.

Coughing and wheezing in the chest, with paroxysms of asthma, may be present.

(d) A fourth group would include those cases of vasomotor turgescence which we occasionally observe in the pregnant woman. This type of disturbance usually manifests itself about the middle of pregnancy and persists until it is brought to an abrupt termination with the emptying of the uterus. Under this class could be brought all the cases which are the product of sexual excitation or perversion.

It has generally been accepted that all forms of vasomotor disturbances, whether of the paroxysmal or perennial type, require as the essential predisposing factor the existence of what is known as the neurotic temperament. This nervous temperament manifests itself in individuals prone to these vasomotor disturbances, either in the exalted type of excessive nervous energy or in the reverse condition of lowered or exhausted nervous energy. The latter is usually designated as neurasthenia. In the paroxysmal types of vasomotor disturbances, it is also generally accepted that there must be a hypersensitive nasal mucosa in order to respond to the action of the external exciting cause.

In the type of cases considered by Richardson, the condition of the nasal mucosa and that of the accessory cavities seem to have no etiological bearing upon the development of the disease. This he has frequently demonstrated by the removal of spurs and correction of deformities without exerting any influence on the progress of the case; in fact, the consideration of this point brings up the whole question as to the nature of these invasions, the source of the infection or irritation, and the method by which the source of irritation or toxin produces the vasomotor changes.

In regard to the seat of these affections, there seems to be a general impression that the disturbance is primarily one of the nasal turbinal tissue, excited through the external source of irritation or from the pathological change within the nasal chambers. From a careful consideration of many cases that have been under his observation, Richardson is rather inclined to believe that the nasal mucosa only plays a secondary part in the process, the primary condition being a general rather than a local one, which expends its force on the nervous system, resulting in disturbing the stability of the bulbar centre, with relaxation of the vasomotor control of the mucosa of the upper air tract. Whatever impression may be gained from the objective examination of the upper air tract, which varies greatly as to the deviation from the normal in the cases examined, there will be even presented in the clinical history of all cases the same evidence of undue mental strain, however produced, with oftentimes a corresponding disregard of many of the ordinary hygienic rules of healthful living.

The source of the irritant, whatever its character, must be, in most of these perennial cases, from within, rather than from without the

body. It also seems evident that the irritant agents must be diverse or an agent or toxin that can be generated through various violations of the normal physiological processes. Is the irritant a result of the alteration of some of the normal internal secretions, faulty metabolism, imperfect elimination, or production in excess of some normal excretion, the result of biochemical changes in the blood, or from the absorption of toxin generated within the gastro-intestinal tract? It is impossible from our present knowledge to even make a conjecture. These cases, the paroxysmal and the perennial vasomotor disturbances, come under our special care, and we have to accept them, but how little have we done in a scientific spirit to get down below the surface and investigate as to what change takes place in the fluids or tissues of the body that renders an individual susceptible to the source of external irritation in the one type of cases, and to the probable generation of irritants in the other type of cases. The manner in which the irritants or toxic agents produce this action is also a question of speculation.

After a thorough study of the clinical histories of cases and objective examination of these nasal cavities which appear to be normal, as well as those cases in which abnormal conditions have been restored, we have been forced to conclude that the primary impulse that causes the turgescence of the turbinals, with resulting blockage of the nasal passage, comes through the nerve centres and is not due to local nasal changes. These storms, as they may be called, usually occur at times when the nerve centres are made unusually susceptible through excitement, excessive fatigue, or undue mental activity or strain. In all probability at the same time and through similar influences, the irritant agent, or toxin, is produced in excess. These disturbances occur at intervals, and in a manner which, to all observant patients, bear out the logic of these conclusions. The patient will notice that the nasal passage will be very free throughout the day, when, through want of conformity with physiological laws with which they know they should comply, in regard to exercise, diet, and work, they will note a gradual filling up of the nasal passage, due not to any local influences whatever, but as the result of the disturbed enervation of the unstable centres generated through the violation of hygienic rules and simultaneous in production of the irritant or toxin.

Notwithstanding the fact that there is a strong conviction in many minds that this condition is solely the product of local changes within the nasal chambers, Richardson is strongly impressed with the conviction that perennial vasomotor disturbances of the upper air tract are of constitutional rather than of local origin.

Common Colds. An investigation of the prevalence of common colds and the economic loss due to them was made by James A. Honeij,¹

¹ Boston Medical and Surgical Journal, April 27, 1911.

and his results are very interesting. Fifteen thousand cards of investigation were sent out, and resulted in 1633 cases of colds fit for careful study, although the total number of individuals with colds was 3845, or, including the persons in the family affected with colds, 6591. The summary is as follows: (1) Over half the population have colds during the course of the six months from December to June. (2) One-fifth of the population are absent from work on account of colds. (3) The average loss of time for 568 individuals was six days per six months. (4) The average loss of money was \$21 per six months, not including individual expenditures for medical treatment, etc. (5) The total loss in six months' time was \$12,105.37 for 568 individuals. (6) In addition to this there is a loss of energy equivalent to \$3 per six months per person. (7) The most common cold is the "head cold." (8) Most colds occur in the month of March. (9) Individuals from thirty to forty years of age suffer most from colds. Department store employees suffer most in proportion. Half of them lose time on account of colds. The conclusions drawn from this investigation are: (1) Preventive methods are essential in dealing with common colds. Better working conditions, pure air, even temperature, proper ventilation, and the proper amount of humidity are important factors. Nourishment, general hygiene, and proper clothing are necessary precautions as in guarding against all other diseases. (2) After the onset of a cold, proper diagnosis is essential to ascertain whether the cold is infectious. (3) Individuals suffering from infectious colds should be isolated.

DRAUGHTS AND COLDS. Macfie¹ believes that draughts do occasionally play an auxiliary part in the production of colds, but that they are easily deprived of their dangers, and should be favored rather than feared. To endeavor to escape colds by avoiding all draughts must always be futile and a foolish policy, and will not only defeat its own aim, by fostering bacteria and by promoting vasomotor lethargy and incompetence, but will lead to deficient vigor through interference with skin reflexes, which play an important part in the respiratory and circulatory functions. When we wish to excite the respiratory centre of the newborn babe we appeal to its skin reflexes, and, in case of night sweats, a breeze on the skin seems to give tone to the whole vasomotor system. The skin is certainly meant to be exposed to moving air currents and to vicissitudes of heat and cold; it is meant to have a blood-supply that ebbs and flows according to the thermal needs of the tissues; it is meant to perspire and to transpire; and accordingly to shut it off from wind currents and to enclose in it a motionless layer of moist air is, Macfie declares, to depart very far from the ways of physiological righteousness. The bracing effects of dry air and of seaside breezes are largely due to their stimulating effects on the excretory

¹ British Medical Journal, January 14, 1911.

and reflex functions of the skin; and the man who endeavors to avoid colds by avoiding all draughts, will not only catch more than his share of colds, but will possess much less than his share of health and vigor.

HEXAMETHYLENAMIN IN COMMON COLDS. As a cure for common colds, Austin Miller¹ thinks hexamethylenamin may be as great a boon as it has proved to be as a urinary antiseptic. In most cases, he says, it acts promptly and efficiently. The irritating, watery secretion of coryza stops; the fever, aching, and malaise of influenza cease; the threatening disease is averted. It should be administered at the earliest possible moment, that is, when the nose begins to feel stuffy or the discomfort begins. Its use after the infection has existed for several days is less gratifying, possibly on account of the mixed infection at that time with pus organisms. He gives 15 grains four times a day, with copious water drinking to lessen the possibility of bladder irritation.

"Catching Cold" by the Tuberculous. C. Sabourin² classifies in a number of groups the "false colds" of the tuberculous, that is, symptoms from sudden congestion from any cause, and which the patients ascribe to catching cold. In one case, for instance, a young man with Hanot's cirrhosis of the liver had profuse purulent expectoration each time as the initial symptom of recurring exacerbations of the liver trouble, while at other times a mild apical tuberculous process gave scarcely any signs of its presence. When the tuberculous actually have caught cold, the flora of the upper air passages appear in the sputum to such an extent that this is an unfavorable time for examining for tubercle bacilli. The effect of the "cold" on the tuberculous process varies according to the care the patient takes of himself. An ordinary "cold" is an infectious catarrh following chilling of the skin, and the tuberculous who take care to harden their skin seldom take "cold," and when they do, they take rational care of themselves while it lasts. In these conditions the "cold" is generally mild and leaves no relics after it has passed off, not aggravating the preëxisting lesions. But a neglected cold in the tuberculous who are not taking good hygienic care of themselves is liable to stimulate the tubercle bacilli to renewed activity, or complications are set up by the infectious catarrh.

Catarrh of the Nose and Throat and Indigestion. Mayo Collier³ points out that not all coughs and colds are related to disease of the lungs, in fact, that cough as a symptom is more often not associated with lung trouble. By taking the respiratory tract as a whole and dividing this into the upper respiratory tract and the lower respiratory tract, or all that portion above and below the cricoid cartilage, a very large percentage of cases of coughs are due to affections of the upper respiratory tract, a very few in reality due to affections of the trachea and lung

¹ Journal of the American Medical Association, June 10, 1911.

² Revue de Médecine, Paris, June, 1911.

³ Lancet, September 30, 1911.

proper. It follows from this that every physician who is called upon to diagnosticate and treat coughs should be an expert rhinologist and laryngologist.

He says the amount of medicine that is annually swallowed by patients attending the out-patient departments of our hospitals, who apply for the relief of coughs, is appalling and regrettable. Most of these cases are due to affections of the upper respiratory tract requiring some local application of an astringent or soothing nature. It is unreasonable to conceive that nature would expose a vital organ such as the lung to all the petty troubles and grievances due to the ever-changing conditions of the atmospheric environments. The same argument applies with equal force to the stomach. Indigestion is one of the commonest of troubles, yet in but few cases is the stomach at fault.

The alimentary tract extends from the lips downward, yet the possible causes of indigestion existing in the mouth, nose, and pharynx are mostly ignored. The association of catarrh of the upper respiratory tract and indigestion is quite common. The respiratory tract crosses the alimentary tract at a point in the pharynx, and both the lungs and stomach are open and liable to be infected and disturbed by abnormal conditions of either the mouth or nose. Septic conditions of the mouth, teeth, tonsils, and other glands, and catarrhal conditions of the nose and postnasal space are quite common affections in these temperate latitudes.

In postnasal catarrh and catarrh of the pharynx, large quantities of unhealthy germ-laden mucus find their way into the stomach, and are a common associate of indigestion of the fermentative or flatulent type. A careful examination of the upper respiratory tract and upper alimentary tract in all cases of coughs and indigestion is thus imperatively necessary if a proper diagnosis is to be arrived at.

Purulent Rhinitis and Ozena. In a contribution to the subject of ozena, Fraser and Reynolds¹ give the results of their observations in 138 cases of ozena and 22 cases of purulent rhinitis, from which the following conclusions are drawn:

1. No clear line of demarcation can be drawn between chronic purulent rhinitis and ozena.

2. Chronic purulent rhinitis (ozena) usually begins early in life as a hypertrophic catarrh of the nasal mucous membrane; the inferior turbinal is most severely affected, and has frequently gone on to atrophy, while the middle turbinal is still in the hypertrophic stage.

3. The most common causes are the exanthemata, coryza in infants, and syphilis.

4. Chronic purulent rhinitis leads to various changes in the nasal mucosa, notably metaplasia of large areas of the superficial ciliated

¹ Journal of Laryngology, Rhinology, and Otology, London, April, 1911.

epithelium into squamous epithelium; dense small-celled infiltration of the submucous tissue (most marked in the superficial layers); catarrhal changes in and atrophy of the mucous glands; diminution in size and number of the cavernous blood-spaces. In many cases there is atrophy of the turbinal bones, especially of the inferior turbinal. In some cases there is arterial disease, and in the majority of cases there is sclerosis of the deeper layers of the submucous tissue. These changes have their counterparts in the mucous membrane of the accessory sinuses in certain cases of chronic suppuration, in the middle ear cleft in certain cases of chronic suppurative otitis media with cholesteatoma formation, and in the bronchi in such conditions as chronic purulent bronchitis and bronchiectasis.

5. Various microorganisms give rise to the first stage of ozena, *i. e.*, to acute and subacute purulent rhinitis, *Micrococcus catarrhalis*, *pneumococcus*, *staphylococci*, and *streptococci*, etc. The characteristic picture of ozena is probably only produced when the *Bacillus mucosus ozenæ* is present.

6. Ozena is more likely to develop in a congenitally roomy nose than in a narrow one on account of the greater tendency in the former to stagnation and consequent putrefaction of the secretions.

7. Atrophy of the nasal tissues may be due to the pressure of the crusts and to vascular or sclerotic changes, but is probably mainly due to toxic influences.

8. Tubercle and syphilis are concerned in the production of ozena, in that they may lead to chronic purulent rhinitis.

9. Accessory sinus suppuration is not the cause of ozena, though it not infrequently complicates this condition.

10. It is clearly established that ozena not infrequently occurs in several members of the same family, and there are some grounds for regarding it as a contagious disease.

11. Those who support the "primary bone disease" theory in regard to the causation of ozena have not shown that changes in the bone precede those in the mucous membrane; a lowered state of general health and neglect of treatment have probably more to do with the transition of purulent rhinitis into ozena than "congenital tissue weakness."

Multiple Abscesses of Nasal Submucosa in Leukemia. The occurrence of interstitial hemorrhages in leukemia is almost the rule, but their development into abscesses is rare. Out of ten cases of leukemia in which J. P. Tunis¹ had the opportunity of examining the nasal cavities post mortem, only one showed the formation of abscesses. The patient, a man, aged forty-four years, died after an illness lasting three weeks, from acute lymphatic leukemia. Epistaxis, hemorrhages from the

¹ American Journal of the Medical Sciences, January, 1911.

gums, and swelling of the cervical glands were the prominent features of the disease. Portions of mucous membrane removed from the middle and inferior turbinals showed to the naked eye numerous punctate hemorrhages, and microscopically much thickening with edema and round-celled infiltration, and in places small abscesses with large numbers of streptococci in their border zone. It was estimated that there were at least one hundred of these abscesses in the nasal mucous membrane.

Nasal Hemorrhage Due to High Blood Pressure. Gerhard H. Cocks¹ reports the case of a man, aged fifty-six years, who complained of profuse bleeding from the nose at frequent intervals for a period of one week. He said that the amount of blood lost was very large, a statement borne out by the extreme pallor of his nasal and buccal mucous membranes. It literally gushed from his nose for several minutes, two or three times a day. Careful and repeated examinations of the nose and nasopharynx failed to reveal any abrasion.

The blood pressure, taken one week after the initial hemorrhage, registered 235 mm. mercury by the Janeway sphygmomanometer. The left ventricle of the heart was apparently slightly hypertrophied, and the aortic second sound accentuated. The vessel walls of the radial and temporal arteries showed but little sclerosis. The urine had a specific gravity of from 1018 to 1024, with occasionally a trace of albumin, and sometimes a few hyaline and granular casts. In one instance, a small amount of sugar was found. His general health had been good, his only symptoms being slightly increased micturition at night.

Treatment was at once instituted to reduce the blood pressure, as follows: (1) Milk diet. (2) Sodium nitrite, one-half grain every four hours. (3) One-half ounce of Epsom salt every morning. (4) A nasal astringent consisting of tannic acid, 10 grains to one ounce of oleo-stearate of zinc, applied locally. Since treatment was started he has had no more bleeding.

Record of blood pressure: February 18, 1910, tension, 235; March 3, tension, 210. Was tested at 3 P.M., and had taken medicine but once, at 8 A.M. March 7, tension, 180; April 18, tension, 175. On March 7, all medication was discontinued and the patient placed upon an ordinary diet, with meat but once a day.

Removal of Septal Spurs. J. B. Kanter² recommends the submucous resection of septal spurs by the use of the chisel, and states the advantages of this method as follows: It avoids troublesome secondary hemorrhage by leaving no exposed cut surface of cartilage or bone. It takes very little, if any, more time than the saw operation. There is no bothersome scab and crust formation. A functioning mucous membrane is left in place of scar tissue that would result from the saw

¹ Laryngoscope, January, 1911.

² New York Medical Journal, October 28, 1911.

operation. There is no recurrence of the spur from thickening of the exposed cartilage or bone and scar in the mucous membrane. The wound in the mucoperichondrium heals rapidly. In five days or a week healing is complete.

Complications of Submucous Resection of Nasal Septum. While the beneficial results of the submucous resection of the nasal septum are well recognized, the fact that serious complications may and do occur must not be overlooked. For this reason more conservatism in the selection of cases for this operation is urged by Alexander and Parry.

Alexander¹ divides the complications into hemorrhage and infection. Severe hemorrhage during or after the submucous operation is not very frequent, and when it occurs is usually due to laceration of the sphenopalatine artery or one of its branches. He mentions one case in which there was profuse hemorrhage, and before this could be controlled by tampons the patient lost considerable blood and was compelled to remain in the hospital suffering from intermittent bleeding; later an acute mastoiditis developed, for which he was subsequently operated upon. Secondary hemorrhage is generally moderate, and may be due to the reaction from the cocaine, or premature or careless removal of the packing by the physician, or the removal by the patient himself.

Infections occurring after the submucous operation are not rare, as Alexander has seen 21 occur in 400 cases. The infection may vary from the mildest tonsillitis to the most severe purulent meningitis and septicemia. Most of the cases are of the milder type, such as sore throat, tonsillitis, stiffness of muscles of neck with headaches, combined with general feeling of malaise, which are usually due to absorption of septic material from the intranasal tampons and yield readily to treatment. Acute catarrhal and purulent otitis media and acute mastoiditis occur frequently. In the middle ear infections, prompt incision of the drum and careful after-treatment generally prevents mastoid involvement. Occasionally, however, the mastoid cells become involved and operation is imperative. Very severe infections, such as meningitis, abscess of septum, and septicemia are of very rare occurrence, but do occur. He reports one case and mentions two others in which severe infection occurred, two ending fatally in acute purulent meningitis.

L. A. Parry² reports a case of extensive erysipelas of the pharynx, face, and scalp following an operation for submucous resection of the nasal septum in a man, aged twenty-seven years. The erysipelas cleared up, but was followed by a severe meningitis, which was combated with a polyvalent antistreptococcic serum. The patient eventually recovered.

¹ New York Medical Journal, October 14, 1911.

² Lancet, London, September 30, 1911.

Rhinogenous Traumatic Meningo-encephalitis. Manasse¹ reports a case of this type in a girl, aged sixteen years, who, while knitting in a railway carriage, had one of the needles driven into the left nasal chamber. She lay unconscious for hours. Within the next two days headache, vomiting, and purulent nasal discharge set in. The syndrome of meningitis was in evidence when the patient was first seen. Lumbar puncture showed a sterile fluid. The frontal and ethmoidal sinuses were at once opened, and bony tissue removed until the dura was accessible. This was split along the track of the needle wound, and the opening drained with iodoform gauze. Despite precautions a cerebral abscess formed, the pus from which contained the *Diplococcus lanceolatus*. The patient recovered. Manasse had not been hopeful of the outcome. The novelty of the case left him without precedent, and he simply followed the principles which underlie the treatment of otogenous meningitis. An integral part of the management was repeated lumbar puncture.

Transplantation of Bone for Nasal Deformities. Most of the work in this field of surgery has had for its object the supplying of deficiencies in the long bones and the bones of the skull, while little has been said about the introduction of bone into the soft tissues where the conditions for its nourishment and growth must differ widely from the former.

Carter² reports three cases operated upon by this method with most gratifying results, and believes that a large proportion of those cases of deformity that have been considered hopeless can be cured by this method of treatment, which is far superior to all methods involving the introduction of foreign bodies into the tissues.

It is generally admitted (1) that the autoplasmic operation, *i. e.*, the transference of bone from one part of the body to another, is the ideal method, and gives the quickest and best results; (2) that homoplasmic transplantation, *i. e.*, from one animal to another of the same species, is usually successful; (3) that heteroplasmic transplantation, *i. e.*, from one animal to another of a different species, is unsuccessful.

There is considerable difference of opinion as to the fate of the transplanted tissue, the majority of writers believing that all transplanted bone is resorbed and is replaced by a new growth of bone from the periosteum. This belief, however, is held chiefly by those who have done the monoplasmic operation, and their observations throw little light upon the fate of the bone in Carter's cases, for in these each patient furnished his own bone for transplantation.

Carter divides depressed deformities of the nose into two classes: (1) Cases without loss of bony tissue. (2) Those in which a large part

¹ Deutsche med. Wochenschrift, October 12, 1911.

² Journal of the American Medical Association, April 29, 1911.

of the bony framework of the nose has been destroyed. Cases of the first class are amenable to his bridge-splint operation, which he has already described and used satisfactorily in about 40 cases. But the second class, as he stated in his first presentation of the subject several years ago, cannot be relieved by this method, as the bridge-splint operation depends upon the presence of bone tissue in the nose to retain it in the corrected position after the removal of the bridge.

Each of the cases reported had a depressed deformity due to traumatism, and each had suffered considerable loss of bony framework. Carter believes that in the transposition of bone from one part of the body to another, the transplanted tissue receives only a temporary injury and that it continues to live and takes part in the process of repair in its new position in the nose. The rib is selected because it is easily removed, and the piece can be easily shaped to suit the deformity. The patient suffers little or no discomfort, as the deficiency is quickly filled in by the periosteum. Furthermore, the rib is well adapted for transplantation because it is so well supplied with minute nutrient foramina.

The periosteum is removed from the grafts because: (1) It is easier to resect a rib without injuring the pleura, by shelling it out of its periosteum, and besides, it is desirable to leave the periosteum for the reconstruction of the rib. (2) The bare bone is more quickly and surely nourished by the connective-tissue envelope which quickly surrounds it. (3) The osteogenetic layer of the periosteum can be dispensed with, since we have no desire to grow bone, but only to nourish the transplanted tissue.

The operation was essentially the same in all three cases. The nose and the right side of the chest are prepared for an aseptic operation. A transverse incision is made over the nasofrontal suture, and through this the skin and subcutaneous tissue are elevated over the dorsum of the nose with a long, thin, two-edged knife, curved on the flat. Above the incision, the tissues, including the periosteum, are elevated for about three-fourths of an inch over the naso-frontal process. About two inches of the ninth rib at about its middle are then shelled out of its periosteum and removed. This piece is then split in its transverse diameter, the medullary tissue is scraped off, and one of the strips of compact bone is shaped to suit the deformity. This is inserted into the wound previously made in the nose; one end reaching well down to the tip, and the other being placed under the periosteum over the nasofrontal process. The wounds are closed with fine silk and broad sterile dressings applied.

Papilloma of Nasal Septum. This form of nasal tumor is exceedingly rare, Arrowsmith¹ being able to find but 34 recorded cases, to which

¹ Laryngoscope, February, 1911.

he adds one of his own. The patient, a girl, aged twelve years, had suffered from left-sided nasal obstruction with some bleeding and soreness for a year. A small growth $\frac{3}{16}$ of an inch in diameter was found on the left side of the septum just behind the columnar cartilage. The growth was removed, and upon section was found to be a papilloma.

Extirpation of Tumors of the Vomer through the Roof of the Mouth. In two cases of malignant disease of the vomer, each with a pear-shaped enlargement of the septum which completely closed the posterior nares, C. H. Mayo¹ was able to remove the growth through the roof of the mouth by the removal of a section of bone 1 inch long and $\frac{3}{4}$ of an inch wide. In neither of these cases was it necessary to sever the soft palate, as advised by Nélaton, a procedure which, he says, complicates the technique of the operation and the after-care of the patient.

Iodothiocinnamine in Cicatrices of the Nasal Cavity. A very interesting case is described by Elio Fabri² in which, as the result of a severe accident, extensive synechie, with almost complete occlusion, had formed in both nasal cavities. Having cut with scissors the most prominent bands, the surfaces were dressed daily with pledgets of gauze saturated with iodothiocinnamine for twenty-four consecutive days. Cocaine was applied before each dressing. On alternate days 1 c.c. of iodothiocinnamine was given by deep gluteal injection on forty occasions. An excellent result is reported. He leaves it an open question how much of the success obtained was due to the local treatment apart from the injections.

Relation of Nasal Obstruction to Articulatory Capacity. In his examination of the consonantal articulatory capacity of 700 children and its relationship to the degree of nasal obstruction existing, Jones³ found that in average school children (469 cases, 106,500 tests) the articulatory capacity for consonants varies with the degree of nasal obstruction. The dependence of the capacity on this factor is not very close, but is much more decided with boys than with girls. The incidence of nasal obstruction being equal in both sexes, it would seem that a given degree of it produces, through partial deafness or in some other way, a more harmful effect on the articulatory capacity of boys than on that of girls. This is in harmony with his hypothesis, previously put forward, that hearing is more essential in the acquirement of speech with boys than with girls, the latter making use of a second channel of education, lip-reading, which is shut to boys. In children with gross articulatory defect or dyslalia (231 cases, 52,000 tests) no correlation whatever was found between the extent of this defect and the degree of nasal obstruction present. Investigation of a larger series might

¹ *Annals of Surgery*, September, 1911.

² *Bolletino delle Mal. d'Orrecchio*, etc., Florence, 1911, p. 80.

³ *British Journal of Children's Diseases*, June, 1911.

reveal a slight correlation, but nasal obstruction is evidently not an important cause of dyslalia in general, and any action it may have is readily obscured by that of more important factors.

Salvarsan in Syphilis of the Upper Respiratory Tract. The rapid and beneficial results of this drug in nasal syphilis is shown in a case reported by G. N. Biggs,¹ in which the lesion was rapidly progressing in spite of very active treatment. The patient was a woman, aged thirty-five years, who had suffered from sore throat and discharge from the nose for five years. She had been thoroughly treated by mercury and potassium iodide by the mouth in large doses, and mercurial inunctions over a period of eighteen months. Following this, the disease became much more active; there was extensive ulceration of the soft and hard palate, and the nasopharynx, the septum and turbinate bones have been completely destroyed, and the nasal cavity was extensively ulcerated. Ulceration commenced at the *alae nasi* and extended over the rest of the nose, assuming almost the appearance of a malignant growth. On April 1, 1911, an intravenous injection of salvarsan (0.4 gram) was given. Six weeks after the injection the ulceration had quite healed and the growth entirely disappeared.

Safranek² observes that most arsenical preparations are not only toxic to the spirochete (parasitotropic), but also to the host (organotropic). Salvarsan is parasitotropic without being organotropic. The drug acts well, not only in cases of primary sore, mucous patches and condylomata, in which the organisms are present in large numbers, but also in cases of tumor formation and ulceration in which they are absent or scanty; the remedy is also very beneficial if given to the mother before the birth of a child—probably on account of the liberation of endotoxin. Occasionally it fails to act, while in other cases there is a return of the disease. The Wassermann reaction may remain positive after the drug has been given.

He reports 25 cases: (1) Tertiary ulcer of septum nasi, intramuscular injection; cure in seven days. (2) Gummatous abscess of nasal bone, ozena; incision of abscess, subcutaneous injection of "606;" high temperature, cure in ten days. (3) Ozena, ulcer of nasopharynx, epiglottis, and cords swollen and red; intravenous injection, burning pain in neck and ear, cure in twelve days. (4) Papular eruption in pharynx and mouth; subcutaneous injection, marked local reaction, cure in five days (7 similar cases were successfully treated). (5) Ulceration of tonsils and fauces (4 cases); cure in four or five days after injection. (6) Erythematous affection of pharynx and larynx; also reacted promptly to "606." (7) Tertiary disease of the pharynx (5 patients); 4 of these were cured, but in one the injection did no good. (8) In one case of combined tuberculosis and syphilis of the larynx the result was fairly

¹ Journal Laryngology, Rhinology, and Otology, London, August, 1911.

² Zeitsch. f. Laryngol., Band iii, Heft 5.

good. Salvarsan has a favorable action in cases of syphilitic ozena. As a rule there is a marked local reaction twenty-four hours after the injection in addition to the general reaction; the patient complains of a burning feeling in the part affected.

J. L. Bunch¹ reports a case of congenital syphilis treated by salvarsan. At the age of three weeks the child suffered from rhinitis, which developed into snuffles. Later a papular eruption and mucous tubercles developed. Salvarsan (0.04 gram) was injected in the scapular region; this was followed by a rise in temperature and local swelling. A fortnight after the injection the mucous tubercles and snuffles had disappeared, but the Wassermann reaction was still positive ten days later.

In Gerber's² earlier cases the drug was given by the intramuscular method, in the later by the intravenous method. Comparing the two, he considers the intravenous the more disagreeable at the time, but the less so afterward. In 2 cases of intravenous injection collapse occurred, and, in 5 out of 9 cases, shivering, vomiting, and diarrhea. He regards the drug as absolutely harmless if properly used. Of 12 syphilitic cases, the most remarkable was one of laryngeal stenosis, which had for three years resisted treatment by mercury and iodides and dilatation with bougies. Four days after injection all respiratory obstruction vanished, and the glottis became quite normal in appearance. In 11 of the 12 syphilitic cases, all signs of the disease were absent in from three to fourteen days after the injection, while in the twelfth (a nasal case with sequestrum), healing was complete in six weeks. Two cases of Vincent's angina and 1 case of scurvy were healed in from three to five days after injection. A case of scleroma remained unaffected. He regards salvarsan as the best and most rapid remedy for diseases due to spirochetes, especially, of course, syphilis.

THE ACCESSORY SINUSES

Non-suppurative Ethmoiditis. In describing this form of ethmoiditis, Paul L. Marquis³ points out that while it has received comparatively little attention, it is one of the most important, for, by its recognition and correction, the suppurative form may be prevented, and what is far more important, we may often relieve great suffering which has existed for some time, and baffled the efforts of rhinologists who were looking for manifestations which may not appear until a later period, namely, polypi and purulent secretion.

He calls attention to the fact that the lining membrane of the sinuses is subject to the same inflammatory conditions as any other part of the

¹ Proceedings of Royal Society of Medicine, May, 1911.

² Arch. f. Laryngol., vol. xxiv, Part II.

³ Laryngoscope, January, 1911.

nasal mucous membrane. These can arise primarily, or as is more usually the case, by extension from the mucous membrane of the nose. When the ethmoid membrane is involved, we may find all the various changes from that of simple inflammation to the formation of polypi and bone necrosis.

The method of development of non-suppurative ethmoiditis is as follows: In the course of an acute rhinitis the entire mucous membrane of the nose is affected. However, as the general process subsides, the membrane covering the ethmoid wall and the outer side of the middle turbinate, owing to poorer facilities for drainage and existing hypertrophies from former attacks, does not regain its normal character, but under the constant irritation of the secretions undergoes a sort of hyperplasia. This spreads over the wall of the ethmoid and eventually involves the ethmoidal cells themselves. These cases are often described as vasomotor disturbances in the nose or manifestations of hay fever.

As a general rule, the symptoms of a chronic ethmoiditis are not so pronounced as those of an inflammation of the maxillary or frontal sinus. Probably the most constant is the headache, frequently described as a burning or boring pain at the base of the nose, between the eyes, or it may be supra-orbital. In some cases this may radiate toward the temporal region. It may closely simulate supra-orbital neuralgia. Frequently patients complain of a sense of fulness in the eyeball, pain on reading, spots in front of the eye, and especially increased tear secretion. Disturbance of the sense of smell is frequently complained of—the constant odor of burnt straw, or, on the other hand, the sense of smell may be entirely lost. Owing to the profuse secretion there is frequently an eczema around the edge of the nose. The secretion may be so increased that the patient will use half a dozen or more handkerchiefs a day; still there will be no stain on them as in the case of an empyema, the discharge being thin and watery. Associated with ethmoiditis we frequently see asthma, pharyngitis, catarrhal affections of the middle ear and Eustachian tube, chronic laryngitis, etc. Uffenorde reports a case where a patient was referred to him with suspected tuberculosis of the larynx. General nervous symptoms, even to the extent of melancholia, may be referable to an ethmoiditis.

If we bear in mind the normal anatomy of the ethmoid and the mucous membrane lining it, the diagnosis of this condition is not a difficult one. From the symptoms given, if we are suspicious of an ethmoiditis, examine the middle turbinal, and if possible, the meatus, the bulla, and uncinate process. If there are no signs of polypi, touch the membrane on the outer wall of the turbinal. If it is thick and edematous it is almost pathognomonic of ethmoiditis. Should the turbinal lie closely against the outer wall so that it is impossible to examine the meatus, thoroughly cocaineize the area and insert a Killian speculum into the meatus, spread the blades and fracture the middle turbinal at

its base and deflect toward the septum. A complete view of the meatus and ethmoidal wall, the bulla and infundibulum is now obtained. Frequently a number of small polypi will be found in the meatus. Often the entire chain of symptoms, which before were absolutely inexplicable, such as pain in the eyes, increased watery secretion, headache, tendency to sneeze, asthma, etc., find an easy explanation when the middle meatus is open to view.

If the disease has progressed to the state where we have polypi which are visible in the meatus and infundibulum, Marquis thinks it is not sufficient to remove them with the snare or forceps or even to cauterize the base, but we should look for and remove the cause. If the middle turbinal had undergone polypoid degeneration in its anterior portion, he advises its removal, *i. e.*, the anterior one-third, and then with a Hajek hook open the bulla. Uffenorde's double curette or biting forceps are now made use of, and as much of the ethmoidal labyrinth as is diseased removed. As soon as we reach normal structure we stop, but not until then. If this method be followed, and careful exploration with the bent sound be made constantly during the operation, no mishap will result. The danger of such operations lies in scraping round in the dark with a curette or spoon. If one does not remove anything or attack any cell without seeing just what he is doing there is no more danger in ethmoidal surgery than in that on the outer sinuses.

Infraction of the middle turbinal should be practiced in most cases, and not unnecessarily sacrifice any portion of this bone, but where the structure is diseased it is not only unnecessary, but wholly inadvisable to retain it.

Beck¹ says that most observers have seen ethmoidal disease with and without the presence of pus. Polypi may and do exist in both types of ethmoidal disease, but the polypi also differ in their histopathological consistency. The distinction of these two forms of ethmoiditis is also important from the therapeutic point of view, as well as the course of the affection. The one great difference in these two processes is essentially this: That in the suppurative form we have an inflammatory condition with the increase in the tissues due to such changes, including the epithelium, subepithelial tissue, the areolar tissue and bloodvessels. The glands are not much destroyed early in the process. The bone is frequently involved in the inflammatory process and later often becomes necrotic, while in the non-suppurative form the increase in the tissue is principally a degenerative process of a myxomatous type. Here the glands are markedly changed in atrophy. Inflammation is not present to any degree. There are also various degrees of changes in both varieties. The changes are a matter of degree of either inflammation and degeneration, and destruction. As to the etiological factors, Beck can

¹ Laryngoscope, March, 1911.

say nothing positive, but is inclined to believe that both varieties are due to a process of infection. In the non-suppurative form there exists most probably at one time infection, which is a lower form of microörganism, and this continued as a low grade of inflammation and degeneration. That deflection of the septum and ridges on the same which come in close contact with the middle turbinal, may act as an irritative cause or shut off the ventilation and drainage of the ethmoidal region and bring about the so-called hyperplastic changes, with the whole coterie of symptoms, can easily be accepted, as Uffenorde and others show.

Ocular Symptoms of Sinus Disease. The *field of vision* in established disease of the accessory sinuses of the nose has been the subject of study by many rhinologists and ophthalmologists during the past year. There have been many variations in their findings, though all seem to be in accord that the enlargement of the blind spot of Mariothe, especially for green, is the most constant symptom present.

The changes in the field of vision seem to be more frequent in the chronic forms of sinus disease, particularly those involving the posterior ethmoidal and sphenoidal cells. Gronholm reports a case of *disease of the chiasm* due to empyema of the posterior ethmoidal and sphenoidal cells. Krauss reports a case of *superior hemianopsia* which gradually disappeared after puncture of the sphenoidal cells of the same side. McWhinney, Coffin, and J. N. Risley report a series of cases of sinus disease, in which *enlargement of the blind spot* was found with central and paracentral *scotomata*.

According to Albert H. Andrews,¹ there are a number of ways in which diseases of the nasal accessory sinuses may affect the intra-ocular structures: (1) Through the venous channels; (2) through the arterial supply; (3) through the sensory and motor nerve supply; (4) through the sympathetic nerves; (5) probably by general absorption of infectious material.

In discussing this subject, H. H. B. Cunningham² says acute sinusitis, as a general rule, is a disease of short duration with definite febrile symptoms; on the other hand, chronic sinusitis, a chronic purulent inflammation affecting the mucous membrane lining the sinus in question, with more or less occlusion of its ostium so that the sinus becomes filled with pus, may exist for some considerable time without producing symptoms. It is this disease which is the origin of many ocular affections. Various pyogenic microörganisms are concerned in the production of this pus, such as streptococci, staphylococci, pneumococci, and others, of which the streptococcus is the most important, the presence of this microörganism usually necessitating a grave prognosis.

¹ Journal of the American Medical Association, August 19, 1911.

² Journal of Laryngology, Rhinology, and Otology, London, July, 1911.

The layer of osseous tissue existing between a diseased sinus and its neighboring structures may be very thin, and disease may spread from the unhealthy to the healthy tissue through this plate of bone in three ways: (1) Directly through the bone; (2) circuitously by means of the blood stream; (3) indirectly by means of the lymph circulation.

The most important ocular signs and symptoms are tabulated as follows:

Frontal sinusitis: Periostitis and orbital cellulitis, exophthalmos, diplopia, hyperemia of the optic disk, haziness of the vitreous.

Maxillary sinusitis: Blepharospasm, lacrymation, purulent dacryocystitis, edema of the retrobulbar tissue, exophthalmos, hyperemia of the optic disk, visual disturbance, transient amblyopia, amaurosis.

Ethmoiditis: Mucocoele, purulent dacryocystitis, diplopia, exophthalmos, amaurosis.

Sphenoidal sinusitis: Paralysis of the third nerve, of the sixth nerve, and of the second division of the fifth nerve; papillitis, retrobulbar neuritis, optic atrophy.

The explanation of amblyopia and amaurosis is to be sought in the anatomical surroundings of the optic nerve while in the optic foramen, where pressure may be exerted on the nerve by distention of the veins surrounding it, or by sympathetic edema into the nerve and nerve-sheath.

Visual disturbance due to nasal disease is frequently unilateral, and though it is usual for the homolateral nerve to be affected, occasionally it is the contralateral alone.

Chemosis, papilledema, proptosis, paralysis of the ocular muscles, and redness of the eyelids form the important ocular signs of that very grave disease cavernous sinus thrombosis, often a result of suppuration in the sphenoidal sinus or in the posterior ethmoidal cell.

Occasionally disease in a nasal accessory sinus, while giving rise to reflex symptoms, does not exhibit any very definite sign of its existence, so that attention not being directed to the origin of the mischief, it is at first apt to be overlooked.

Observation has shown the group of symptoms known as asthenopia to be a result of disease of the ethmoid, maxillary antrum, or sphenoidal sinus, and such reflex neuroses as bulbar and periorbital neuralgias to accompany a frontal sinusitis. Blepharospasm, asthma, and even angina pectoris have been traced to suppuration in the antrum of Highmore.

Then there are the cases of so-called eye-strain, whose symptoms consist mainly of frontal headache with pain of varying intensity around one or both eyes. These sufferers have possibly been treated with nerve depressants and tonics, their alimentary system carefully attended to, and even glasses prescribed, perhaps more than once, but to no effect, they all this time being victims of a frontal sinusitis.

In 11 cases of sphenoidal and ethmoidal sinusitis in which the visual

fields were investigated by Wallis,¹ contraction, either general or concentric, was present in every patient, that for red and green being more marked than white, and green being by far the most affected, excepting in 2 cases where the contractions for all colors were proportional. This greater contraction for green is the more remarkable, because when the visual fields of normal individuals were tested with these same colored objects, that for green was as extensive as that for red, owing to the green being tinged with yellow; therefore, white and green accentuate field affections and give the best comparison. In one case the fields for white were full, but those for green showed extreme contraction; in another, there was partial reversal of colors in a young, healthy boy without hysterical stigmata, and appeared to be due to color perception defect. He has noted both these signs in anterior sinusitis.

In addition to general, 8 of these cases showed marked temporal contraction, 5 of which were bitemporal, and 1 a bitemporal hemianopsia. In 2 of the cases, considerable altitudinal contraction was present both in the superior and inferior fields. This form of contraction appears to occur as frequently in the anterior group of sinuses as the posterior. Marked temporal and particularly bitemporal contraction is common in the posterior group, but he has only seen one example in the anterior, that being a very extensive frontal sinusitis.

Island vision and ring scotoma occurred in one case, a severe papilledema which, during the worst stage of visual defect, showed only an island of vision in the temporal field, but during recovery developed into a complete ring scotoma.

Central scotoma occurred four times, which in 2 cases was due to the associated choroidal condition, but in 2 others was caused by involvement of the papillomacular bundle. In 1 of these, chronic sphenoidal sinusitis, it was a passing phase in the ring scotoma, and was to be expected with so serious involvement of the nerve, but in the other it was due to acute sinusitis. Therefore, in chronic sinusitis of the posterior group, temporal contraction is the characteristic symptom, whereas in acute posterior sinusitis the characteristic feature would appear to be central scotoma.

Wallis states that ophthalmoscopic changes are a far more common symptom in posterior sinusitis than in the anterior, as is to be expected from the close proximity of the nerve to these cavities. Three of his cases were chronic sinus suppurations showing no changes in the fundi, but marked contraction in the temporal portion of the visual fields. This is explained by the assumption that the optic nerves are directly involved by a toxic substance which has soaked through into the optic canal and orbit from the sinuses. In chronic sinus suppuration the walls are thin or dehiscent, and the mucosa atrophied, consequently

¹ Journal of Laryngology, Rhinology, and Otology, London, May, 1911.

its power of preventing the passage of toxic substances is greatly diminished. The nasal aspects of the optic nerves are in contact with practically the whole length of the lateral walls of the posterior sinuses, and, if the optic nerves be involved, the temporal field will be the first affected. The papillomacular bundle, being central in position, is protected by the other fibers, and hence scotoma is not seen in chronic cases. In a series of anterior sinusitis cases investigated by Wallis, marked temporal limitation was the exception, and more or less concentric contraction the rule. He accounts for this on the above hypothesis by assuming that further forward in the orbit, opposite the anterior group of sinuses, the toxic substance becomes more diffused, and hence the circumferential fibers of the nerves are equally affected.

Peripheral contraction also occurs when neuritis has resulted from sinus disease, and the latter was present in two cases as neuroretinitis—one as papilledema, and one as “fine” or “hazy” neuritis. In the first two groups, field contraction probably resulted from pressure upon the nerve within the optic canal by inflammatory edema set up by the poisonous substances. In the “fine” neuritis the ophthalmoscopic appearance suggested a condition of edema of retina and nerve, which probably resulted from irritation of the nerve sheath endothelium by the toxic substance, causing pressure upon the nerve fibers with consequent field contraction. This condition of edema is presumably an early stage in the more severe forms of neuritis. It is likely that the two cases showing slight primary atrophy had resulted from a previous hazy neuritis from the same cause. He thinks it is evident, therefore, that posterior sinusitis causes visual field contractions without fundus changes, with fine forms of neuritis and with gross forms of neuritis; these three are probably merely degrees of the same pathological change, and an indication of the amount of toxic material passing through the bony wall.

In Wallis' cases, “gross” forms of optic neuritis only occurred in acute and subacute sinus suppurations, and the “fine neuritis” in chronic sinusitis. Assuming that in acute cases the toxins are carried by the blood stream, and by permeation in chronic cases, then in the former much larger doses would continually reach the optic nerve and surrounding tissues with resulting inflammatory edema than in the latter. This hypothesis for acute suppuration is supported by the often rapid onset of neuritis and central scotoma, together with their quick disappearance when the cause is effectually treated.

Acute sinus suppuration is probably characterized by central scotoma, due to papillomacular involvement, and it has frequently been observed in such cases. It only occurs in the one acute sinusitis in Wallis' series, and he has never noted it in chronic sinus affections of the anterior group. Pressure alone does not always cause central scotoma, for in one case the patient's right optic nerve was affected by severe papill-

edema, but central scotoma was not present. It is possible that a local toxemia is, in part, the cause of that condition. Thus, if central scotoma only occurs in acute cases, it may be overlooked, unless the patients be seen early and the central vision be carefully tested, because the vision in these cases is often rapidly and completely lost. Wallis thinks that the divergent views held by various writers as to the presence or absence of field affections are due to the perimetric observations being made in undifferentiated, *i. e.*, acute and chronic, cases. He thinks that this is a more reasonable explanation than that of the anatomical variations of the sinuses to the nerves invoked by Onodi.

Wallis summarizes his paper as follows: Peripheral field contraction was present in every case, and marked temporal and particularly bi-temporal contraction and bitemporal hemianopsia is characteristic of chronic sinusitis of the posterior group. This is due, in the absence of ophthalmoscopic changes, to the direct action of toxins upon the nerve by contact, and is not of reflex origin. Peripheral contraction in the presence of gross neuritis is due to pressure from inflammatory edema within the optic canal, and in "fine" neuritis to pressure from edema of the sheath of the optic nerve, both resulting from the action of toxins. Peripheral field contractions without fundus changes with "fine" neuritis, and gross neuritis in sinus affections are but degrees of the same pathological process, and indicate the amount of poison which has reached the nerve.

Central scotoma probably only occurs in acute sinusitis, and results from pressure, and possibly partly from the local action of toxins.

The differences in the ocular symptoms of acute and chronic sinusitis depends upon the amount of toxin reaching the nerve; in the latter it soaks through the sinus walls slowly in small quantities; in the former carried more rapidly, and in larger measure by the vessels.

The result of treatment of the diseased sinuses on the contracted fields is most beneficial when the suppurations are acute, and when optic neuritis is present. Operative treatment of the sinuses may cause temporary diminution of the visual fields.

Ring scotoma may result from sphenoidal sinusitis.

The perimeter should always be used in suspected sinusitis. Field changes help to confirm, and their absence to negative, the diagnosis; the presence of central scotoma calls for more active treatment. White and green are the best test objects, the field for green being generally more contracted than the field for white.

Frankenberger¹ mentions the following cases of abscess due to rupture of an empyema of the sphenoidal, ethmoidal, or frontal sinus:

CASE I.—Male, aged thirty-seven years, had diminution of vision and diplopia for five months, left eyeball displaced outward. Left

¹ Zeitschr. f. Laryng., Rhinol., etc., Band iii, Heft 3.

ethmoidal bulla enlarged, left nasal cavity contained pus. Bulla opened with Hajek's hook, anterior ethmoidal cells opened up. The orbital displacement soon recovered.

CASE II.—Male, aged sixteen years, suffered from swelling of eyelids on right side of four day's duration. Right middle turbinal swollen. Sondermann's suction apparatus removed a good deal of pus. The orbital abscess was at first incised and later the ethmoidal labyrinth was opened up and curetted.

CASE III.—Female, aged twenty-three years, suffered from attack of coryza. Some days later sudden swelling of right eye; globe displaced forward. Right middle turbinal polypoid with pus in middle meatus. Patient refused external operation, and orbital abscess burst spontaneously. The middle turbinal was later resected and the ethmoidal region curetted. Both the ocular and nasal conditions returned to normal.

In speaking of affections of the uveal tract, Frankenberger notes that Ziem believes in a direct connection between sinusitis and iritis. Kuhnt, on the other hand, believes that sinusitis is only a predisposing cause; he has, however, seen opacity of the vitreous clear up after treatment of an antral empyema.

In connection with affections of the retina and optic nerve, he gives a short account of Onodi's work and states that if the wall of the optic canal be thin or dehiscant, suppuration in the posterior sinus may lead to perineuritis or to retrobulbar neuritis with limitation of the field of vision, amblyopia, central scotoma, and amaurosis. As Hajek has shown, there may be pressure on the inner wall of the optic canal or on the veins from the sphenoidal sinus, which have a collateral connection to those of the optic nerve. He then gives a brief account of the cases recorded by ten writers. It is interesting to note that in several cases suppuration and even necrosis existed in the ethmoidal and sphenoidal cavities with little or no sign of it in the nose. Frankenberger records the case of a patient, aged twenty-eight years, who had had nasal polypi frequently removed, and had suffered from severe headache since the last operation. Four days after there was sudden loss of vision in the left eye, and the fundus was seen to be hyperemic. The frontal sinuses and antra were normal. A radiograph showed a shadow in the left sphenoidal region. The middle turbinal was removed and the ethmoidal and sphenoidal sinuses freely opened up and curetted. They contained pus and polypi. Color vision gradually returned, but a central scotoma for red and green remained on the left side. The case is not reported as "cured" because polypi and pus still present in the nose.

H. J. Davis¹ reports the case of a female, aged twenty-five years, who was admitted to the hospital as a supposed case of cerebral tumor, but was transferred to him with a diagnosis of sinus involvement. She

¹ Journal of Laryngology, Rhinology, and Otology, London, January, 1911.

attributed her headaches "to standing for hours in the sun at the late King's funeral." The onset was sudden, with acute pain in the right upper jaw and forehead, general constitutional disturbances, sickness, and giddiness. There was ptosis, diplopia, dilated pupil, and right-sided optic neuritis only, and complete ophthalmoplegia externa. Transillumination showed right infra-orbital shadow. The patient was operated upon immediately, the antrum being opened through the cheek, the outer wall of nose removed, middle turbinal and ethmoid mass removed, and the sphenoidal sinus, which was filled with pus, opened and drained. The ocular symptoms slowly subsided and the patient left the hospital well six weeks later.

Operative Treatment. J. H. Bryan¹ discusses the surgical treatment of diseases of the accessory sinuses producing orbital complications, and states that in all sinus diseases accompanied by serious eye symptoms, he would give the patient the benefit of the doubt according to the sinus or sinuses involved, and would endeavor to relieve the condition by the endonasal method; but failing in this, he would advise one of the more radical methods. We are more certain of removing all the diseased conditions in the one or more sinuses that may be involved, and the period of convalescence is much shorter than in the older methods and the danger of relapse is greatly reduced.

Meningeal and Cerebral Complications of Sinus Disease. J. A. Stucky² reports 16 cases, 6 of which recovered, with subsequent finding in 8 autopsies, as illustrations of the varied and serious results that may follow infection of the ethmoid cells, sphenoid and frontal sinuses, and these results are all the more alarming because of the proximity of the silent area of the brain (anterior frontal lobes), which, in addition to being most easily and more frequently involved, give rise to no focalizing symptoms indicating a serious pathological condition.

The objective and subjective symptoms, together with the result of the treatment employed in these cases, leads Stucky to the conclusion that we may, and probably do, often have a localized serous condition which may be either a pachyleptomeningitis, a metastatic meningitis, or a simple pachymeningitis, and he believes that in the 6 cases reported which have recovered, one of these conditions existed, and the free drainage and ventilation of the nasal attic and the accessory sinuses, with the liberal administration of hexamethylene-tetramine in large doses for forty-eight hours, prevented a diffuse purulent condition which would probably have resulted fatally.

Stucky says it is reasonable to presume that congestion or the formation of an exudate is preceded by edema, which is a serous condition, and areas of exudate held within the meshes of the pia, probably were

¹ Journal of the American Medical Association, August 19, 1911.

² Transactions of American Laryngological, Rhinological, and Otological Society, 1911.

serous primarily, which is the prepustular condition, and localized, the path of the infection being through the cribriform plate. Similar conditions have been found in the sphenotemporal lobe as a result of extension of infection from the middle ear. It must be borne in mind that the orbital or basal surface of the frontal lobe rests on the osseous roof of the orbit, and pachymeningitis externa is almost always a secondary consequence of the extension of the disease from the ethmoid, resulting in a localized external meningitis, or an extradural abscess, the clinical features of which are masked by those of the primary affection to which it owes its origin; also that infection through the accessory sinuses may produce leptomeningitis. His conclusions are as follows:

1. The pathological condition need not be suppurative in order to produce painful and fatal results.

2. The infection originates primarily in the ethmoid cells, or their offshoot, the middle turbinate bone, the frontal and sphenoidal sinuses becoming involved secondarily, either through extension by continuity of tissue or by blocking of their natural openings (for drainage and ventilation) long enough for their retained secretion to become purulent.

3. The primary infection in the ethmoid may result in hyperplasia as a result of long-continued inflammation, and the middle turbinate may undergo polypoid degeneration. The increase in size in the latter condition blocks the natural openings of the remaining accessory sinuses, which communicate with the middle meatus, thus producing pansinusitis.

4. Chronic inflammation, thickening, and adhesion of the meninges covering the cribriform plate, probably exist more frequently than is suspected, and are the cause of many cases of chronic headache.

5. Symptoms of serous or circumscribed meningitis and cerebritis when the frontal lobes are involved, these parts not being within the motor and sensory area, are misleading and confusing.

6. A similarity in the symptoms was seen in 16 cases; 10 of these were fatal; in 8 the postmortem findings were practically the same; and in the other 2 the symptoms immediately preceding death were so much like the others that we are justified in concluding that the same pathological, meningeal, and cerebral condition existed, and that the infection started primarily in the ethmoid cells, though the symptoms which led to the surgical treatment was involvement of the frontal sinus.

7. The extension of infection to the meninges or anterior frontal lobes or cerebrum, sometimes leads to a fatal ending very quickly, but more frequently it is very slow, the patient finally dying from systemic toxemia.

Bone Cysts of the Antrum of Highmore. According to John R. Fletcher,¹ bone cysts of the antrum develop within the alveolar process and may

¹ Journal of Ophthalmology and Otolaryngology, January, 1911.

extend into the cavity of the antrum of the nose and of the mouth. They differ from a divided antrum in having as a lining only two membranous layers, *i. e.*, connective tissue and epithelial layer; the uninfected fluid contains crystals of cholesterol, and their interior does not communicate with any part of the antrum or nose in their uninfected state.

The diagnosis is based on a history of long, painless development; tumefaction in the neighborhood of the canine fossa; crepitation upon palpating the enlargement; puncture or withdrawal of fluid or washing out caseous masses, or non-communication of the cavity with the nose. In the treatment it is recommended to remove the anterior wall, dissect out the lining membrane, sterilize the cavity, and fracture its various walls inward and to be kept there by suitable packing.

Endothelioma of the Frontal Sinus. Neil Maclay¹ reports the case of a man, aged sixty-seven years, who first noticed a small ill-defined swelling over the right eyebrow about the close of the year 1910, which was thought to be due to a knock. Subsequently, as the size of the lump increased, it was regarded as a "blind boil" and received some domestic attention. There were no subjective symptoms until a week before advice was sought, and then only pain was complained of, and some slight bleeding from the right nostril. On February 15, 1911, he consulted a physician, who described the condition as a red, fluctuating, circumscribed swelling, the size of a walnut, situated over the inner limit of the right eyebrow. The presence of pus was diagnosticated, and an incision made; only blood escaped, and a friable newgrowth projected from the wound. Four days later he was seen by Maclay, who found a fungating mass, in situation named, which entirely obscured any evidence of incision and extended fully $\frac{1}{4}$ inch from skin surface; the centre of growth corresponded with position of anterior wall of right frontal sinus. A probe could be passed easily into the sinus and down through the frontonasal duct. Great destruction of bone had taken place; not only two-thirds of anterior sinus wall, but a good part of posterior wall had disappeared, and the growth extended $1\frac{1}{2}$ inches toward the frontal lobe. The pathological report described the structure as an endothelioma with much evidence of necrosis. Surgical interference was not advised, and in spite of rapid growth, little or no pain existed until a fortnight before death, which occurred April, 1911, and was preceded by left-sided clonic convulsions.

Intranasal Puncture of the Frontal Sinus. The subject of intranasal puncture of the frontal sinus has been revised by Sieur and Rouvillois² from an anatomical standpoint. They employ Vacher's instrument, which consists of a steel instrument with the double curve of the frontal sinus probe, point and convexity blunt, and with a saw-edge on the

¹ Journal of Laryngology, Rhinology, and Otology, London, June, 1911.

² Revue Hebdom. de Laryngol., d'Otol., et de Rhinol., March 4, 1911.

terminal part of the concavity, and they recommend the following technique: The parts are anesthetized with pledgets of wool saturated with a 5 per cent. solution of cocaine. The middle turbinal and meatus are carefully cleansed. The patient's head is held in the horizontal position by an assistant. The thumb of the operator's left hand gently raises the tip of the nose, the remaining four fingers being steadied on the forehead. The rasp is introduced, and the extremity carried along the angle made by the nasal bones and the septum until an obstacle is met with. The handle of the instrument is now lowered, and the point directed outward toward the upper and inner angle of the orbit. A continued moderate pressure will now carry the point into the sinus. This procedure was carried out with success on the cadaver in 24 cases. They hold that it is possible to perform intranasal puncture of the frontal sinus and consider that clinically it would at least be a useful adjuvant to removal of the middle turbinal and opening of the anterior ethmoidal cells, in order to avoid acute retention while awaiting a convenient occasion to employ external methods.

THE PHARYNX

Lingual and Pharyngeal Sporotrichosis. A rare case of sporotrichosis involving the tongue and pharynx, with threatened asphyxia, is reported by Duverger and Bain.¹ The *Sporothrix beurmanni* was found on bacteriological examination, and treatment with a peroxide mouth-wash and iodide of potassium internally brought about a rapid cure.

The onset of the disease is insidious. All parts of the buccopharyngeal mucosa and even that of the larynx may be affected. It is characterized by the formation of ulcers, which are coated with a fetid material varying in thickness and resembling papier maché. The bases of the ulcers, which may be either discrete or confluent, fungate and bleed readily. There is more or less infiltration of the mucosa, and this may give rise to considerable swelling of the tongue and pharynx. On the palate and pharynx are scattered whitish spots, which probably represent the ulcers in an early stage. The lesions are painless, and may be curetted without anesthesia. There is not often any glandular enlargement nor rise in temperature. Recovery is usually rapid.

Fibrous Polyp of the Nasopharynx. Walter A. Wells² reports 3 cases of this extremely rare growth of the nasopharynx, and insists that care should be taken to differentiate between true fibrous polyps and large adenoid growths. A genuine fibrous polyp occurs, as a rule, singly, and is a large, firm, smooth, opaque growth, made up of dense connec-

¹ Revue Hebdom. de Laryngol., d'Otol., et de Rhinol., April 15, 1911

² Laryngoscope, July, 1911.

tive tissue and attached by a firm pedicle. It is a benign tumor. As to the point of origin of these growths he mentions the following theories:

1. The cranial origin, propounded by Nélaton, who taught that nasopharyngeal fibroma originated in the fibrous aponeurosis covering the basilar process of the occiput.

2. The theory that the pedicle will invariably be found emerging from the choanal region and attached to some portion of the ethmoid, sphenoid, or vomer.

3. The sinusal origin according to which these growths originate in the interior of one of the nasal accessory sinuses, especially the maxillary.

Without presuming to say which of these theories is correct, Wells remarks upon the futility and insufficiency of mere clinical observations to decide these particulars. He is convinced that it is impossible to decide the question either by rhinoscopy or digital examination, and therefore the opinion of those founded on such observation must be regarded as untrustworthy speculation. A case reported by Rouvillois showed at autopsy that the attachment was to the inferior surface of the right sphenoid sinus, to the base of the right pterygoid process, and to the more remote part of the vomerosphenoid articulation.

On account of the severe hemorrhage and consequent high rate of mortality, Wells strongly protests against such radical methods of removal of these tumors as splitting of the soft palate, resection of the hard palate, resection of the soft and bony structure of the nose, and resection of the superior maxilla. He prefers to use a snare with heavy wire, introduced through the nose, and engaged about the pedicle with the aid of the finger inserted into the vault of the pharynx. Slow strangulation does much to prevent the much dreaded hemorrhage. He has operated upon 3 cases in this manner, with complete and perfectly satisfactory results.

Exposure of the Nasopharynx. The method of exposing the nasopharynx as described by Krogius¹ was worked out on the cadaver several years ago, but he has only recently had an opportunity to apply it himself on two patients. They bore the operation well, and the further course was gratifying, while the operation itself was accompanied with remarkably slight loss of blood. It was done for the removal of a fibroma of the nasopharynx in both instances. He applied part of the technique in a previous case two years ago, but found an inoperable tumor in the pituitary body, and the patient died the next day with pulmonary edema. The main features of the technique are the median incision of the lower jaw, enabling the two halves to be turned back on each side, the tongue being drawn down over the cleft. The soft palate is then separated from the hard palate by an incision curving across nearly to the teeth on each side. This permits the soft palate to be

¹ Zentralblatt für Chirurgie, Leipsic, March 25, 1911.

drawn down on the tongue quite out of the way, giving ample access to the nasopharynx through the gap thus left.

Tuberculosis of the Mucosa of the Hard Palate. This case is reported by E. W. Dittrich.¹ A man suffering from pronounced pulmonary tuberculosis about two years ago noticed a small red spot on the right side of the palate about $\frac{1}{4}$ inch behind the posterior border of the palate. It increased somewhat in size, was extraordinarily painful, and refused to heal after becoming ulcerated. He consulted a physician who, after treating it for awhile, told him that he could not do any more for him. Another colleague cauterized it with nitric acid. It disappeared after being treated for some time. About four months ago it reappeared, spreading rapidly; it was then that he consulted Dittrich. During all this time the patient felt good and worked every day. He showed the following condition: On either side of the median line there were aggregations of small papules of the size of pin-heads, which were somewhat acuminate, only little inflamed, did not bleed on touch, and were separated by a deep median furrow. They were more marked on the right than on the left side. The lesions were sharply defined anteriorly and merged into the tissues posteriorly with but very slight inflammatory reaction. Behind the anterior border there was an ulceration on either side of the furrow; the one on the left was the larger in size. These ulcerations were triangular in shape, had irregular margins, were superficial and spreading peripherally. Their bases were red, painful, and slightly bleeding on touch, and were very little indurated, with margins that were only moderately inflamed and covered with a dirty grayish material. They were first touched with 25 per cent. lactic acid, but when this failed to make an impression, 95 per cent. phenol was resorted to. While the right ulceration responded to the application of phenol and disappeared soon, the left one showed a decided tendency to spread. The ulcers finally disappeared, leaving very little scar tissue, and a somewhat tunicated condition of the mucous membrane, the papular, *i. e.*, tubercular condition, spread laterally, at last almost touching the alveolar processes. The microscope showed the epithelium to be moderately edematous. In the connective tissue directly beneath the epithelium were distinct isolated collections of small, round cells, in the centre of which giant-cells were discerned.

Adenoid Vegetations in Relation to Tuberculosis. In 88 cases in which the adenoid growths were examined after excision, Simon² found tubercle bacilli in them in only 3 cases, once from a robust and apparently healthy girl with negative tuberculin reaction. He failed to find tubercle bacilli in the vegetations from six children with pronounced pulmonary tuberculosis, and only once in those from 6 children with manifest tuberculosis of the bronchial glands, showing that the tonsils

¹ Archives of Diagnosis, July, 1911.

² Beiträge zur Klinik der Tuberculose, vol. xix, No. 2.

and vegetations must play only a subordinate part as portals of entry for tubercle bacillus. He advises in treatment merely measures to act on the lymphatic diathesis, leaving the adenoid vegetations alone unless they interfere with respiration. Dieting, brine baths, etc., will act indirectly on the vegetations. But it is extremely important to examine the thorax with care, as also, when there are signs of disease of the bronchial glands or bronchial catarrh, the nasopharynx should be investigated with special care.

Lipoma of the Pharynx. A case of this exceedingly rare tumor of the pharynx is reported by Elmer L. Kenyon.¹ The patient was a woman, aged twenty-seven years, who had for a number of years experienced a vague feeling of "something growing in the throat," and of difficulty in swallowing. There was a tendency for food to lodge somewhere and be recovered after some hours or even two or three days. Breathing was decidedly interfered with. There was some enlargements of the glands at the angles of the jaw, but the external surface of the neck gave no indication of any abnormality within. On depressing the tongue the tumor was seen on the posterior and right lateral wall of the pharynx. Its upper margin reached the base of the uvula when the soft palate was relaxed. It extended downward until its broadened lower portion lay over the laryngeal opening half an inch above the arytenoid cartilages. The tumor was much broader at its base, tapering gradually toward its upper end; its shape at any one time was probably modified by gravitation, due to change of position, as it seemed capable of considerable movement; at its lower part it extended two-thirds the distance across the laryngopharynx from right to left, and gradually lessened until at the upper part the lateral extent was only one-third across. It was covered with healthy-appearing mucous membrane, without evidence of congestion or enlarged vessels. On palpation the tumor was remarkably soft and yielding. The microscope confirmed the diagnosis. The growth was removed under local anesthesia.

Remnant of Pituitary in Nasopharynx. There seems to be some curious relationship between the pituitary and the lymphoid tissue of the nasopharynx. A lot of work has been done in Germany by Erdheim, Haberfeld, and others on the association of the lymphoid tissue of the nasopharynx and the pituitary body, and it has been shown by Killian among others that a remnant of the pituitary bud is always present in the nasopharynx, occupying a position above that of the pharyngeal tonsil. This is the old orifice of the pituitary body, and the connection between the pharynx and the fully formed pituitary body can be traced in many young children. It has been shown that the mouth of the pituitary body, in the course of development, is carried down to the middle of the posterior edge of the septum.

¹ Journal of the American Medical Association, June 17, 1911.

An interesting case is reported by Alexander Tweedie.¹ The patient was a child, aged six months, with median hare-lip, cleft of which was continuous with definite central groove on anterior aspect of columella, and a small pedunculated mass attached to left half of upper lip. The hard palate was intact. Complete mesial cleft of soft palate, entirely occupying which was a soft, cystic, swelling springing from the roof of the nasopharynx. No treatment was considered advisable, and the child died of inanition.

Examination of the head and neck showed the following: Median hare-lip. The nostrils were wider apart than usual, but otherwise were normal. A rounded mass, the size of the end of the little finger, could be seen through the cleft in the palate attached to the nasopharynx. The head having been dissected in such a way as to preserve the abnormality intact, it was seen that the nasal septum opened up behind as a shallow gutter or trough, inside which there was a mass of pure non-striated muscle tissue. Viewed from the side the specimen showed that the infundibulum passed down from above into this trough, and then was continued upward over the mass of non-striated muscle into which it merged. The pituitary body was represented by a nodular formation in the posterior part of the septum. Into the formation of the pituitary body a bud of epithelium from the pharynx entered, passing up toward the infundibulum. In this case the pituitary body, in place of ascending within the cranium, retained the close relationship to the nasopharynx seen in a human embryo at the end of the first month of development. The same early arrest had affected the posterior part of the nasal septum, which in early life presented a trough-like expansion similar to what was visible in this specimen.

Infection of Throat by Colon Bacillus. Calvin B. Faunce, Jr.,² reports a case of acute toxemia caused by infection of the throat by the colon bacillus. The patient suddenly developed headache, chilly sensations, lumbar and joint pains, followed in twelve hours by prostration and a temperature of 103° F. The throat was red, with a grayish-white exudate on the tonsils. The condition became steadily worse, prostration being profound twenty-four hours after onset. Cultures were negative for the Klebs-Loeffler bacillus, but on clinical grounds, 6000 units of diphtheria antitoxin were given. Improvement of the general condition followed, but the throat remained the same. Gradual improvement occurred, the throat being normal in two weeks. All cultures were negative for the Klebs-Loeffler bacillus, but an organism characteristic of the colon bacillus was present. The apparent improvement after the administration of antitoxin was probably due to the coincidental formation of antibodies.

¹ *Journal of Laryngology, Rhinology, and Otology*, London, February, 1911.

² *Boston Medical and Surgical Journal*, April 27, 1911.

Septic Infections of the Throat. M. D. Lederman¹ says that acute septic infections of the throat are caused most frequently by the *Streptococcus pyogenes*, and are usually either extremely serious or fatal. The tonsil is most frequently the point of attack, because of its easily penetrated epithelium, in which cases a glossitis usually results, with edema of the surrounding tissue. When the epiglottis is primarily infected this structure shows the more active phenomena, the adjacent parts suffering secondarily. He reports a number of interesting cases, the first being one in which a tooth had been extracted ten days before the infection became evident. A severe glossitis with invasion of the submaxillary gland and infiltration of the sublingual tissue appeared in forty-eight hours. The resulting symptoms of dyspnea and dysphagia demanded a prompt external operation. Drainage was continued for a few days with recovery.

In the second case a calculus was removed from the sublingual tissues releasing a large quantity of pus and ultimately reducing a brawny swelling extending from the angle of the jaw to the submental region. A third case, following an acute purulent otitis media, presented a prominence on the left side of the neck, very brawny to the touch and exquisitely tender. No fluctuation was detected. There was intense suffering, and deglutition was impossible. Incisions made along the left side of the tongue evacuated a large quantity of pus, and the patient eventually recovered. In another case, edema of the larynx followed a wound of the lower pharynx by swallowing a chicken bone. Incisions made into this area revealed small quantities of pus. Under daily drainings, a prompt recovery followed.

The last two cases are particularly interesting in that they occurred in two sisters, both of whom had previously been operated upon for appendicitis, the first one a suppurative and the second a simple acutely inflamed appendix. In the case of the former, a suppurative epiglottitis with prostration developed within twenty-four hours, and was only relieved by deep multiple incisions into the epiglottis, an abscess cavity being evacuated at the depth of half an inch. The epiglottis resumed its normal size in a few days. In the second case, the onset was also very sudden, but the general symptoms were not so severe, nor was the respiration embarrassed. With the use of adrenalin spray and cocaine applications, with liberal catharsis, the edema, which was largely confined to the left arytenoid, subsided without surgical procedure.

Lederman advises free incision of suspicious areas and the use of autogenous vaccines or a reliable polyvalent preparation of the anti-streptococcus serum.

¹ Laryngoscope, June, 1911.

THE TONSILS

Systemic Infection through the Tonsils. According to L. F. Frissell,¹ infection may occur through the tonsil either by way of the blood stream or by the lymph stream. He divides the diseases which gain access to the body in this way into two main types: (1) Those local infections which cause constitutional disturbance by toxin absorption, of which diphtheria is the best example, and (2) by invasion of the body by bacteria. Of the latter, the most common are tuberculosis and the various forms of septic invasion of the body by pyogenic organisms. Rheumatism may perhaps be caused either by toxin or bacterial entry. Strassman is quoted as having found the tonsils tuberculous in 13 out of 15 autopsies on tuberculous subjects, Domockowski in every one out of 15 cases, Wood in 29 out of 37 cases.

Through animal experimentation it has been demonstrated almost beyond a doubt that cervical glands may be infected through the fauces, but without local lesion. There is also a possibility that the tubercle bacilli can pass through the intact mucous membrane. Recent work by Grobe and others show the occasional presence of a supraclavicular gland lesion connection with the cervical chain, and hence an indirect possibility of apical involvement from the tonsil. This Frissell says must be a rare occurrence, because the connection is not a regular one.

Cases of an undoubted direct passage of the bacteria from the tonsil into the blood stream, producing septicemia, have been reported by Stengel, Woodcock, Adler and Otten. Similarly, many cases of endocarditis, nephritis, pneumonia, pleurisy, meningitis, phlebitis, and eye lesions have been recorded.

Fritz Meyer isolated from 25 cases of rheumatic tonsillitis a diplococcus which produced an arthritis in rabbits. Gurich is quoted as having cured 98 out of 102 cases of arthritis by emptying the pockets of the tonsil of pus. Frissell admits that as yet we know little of the etiological relationship between the exanthemata and their accompanying throat symptoms. Gastritis and pernicious anemia may, he thinks, in some instances be due to slight, but constant, absorption of pus organisms from small foci in the tonsillar crypts.

D. S. Dougherty² states that infective agents, having been absorbed by the tonsils, easily find a further pathway of access to the general system through the lymphatics. The efferent lymphatic vessels of the tonsil empty into the superficial and deep chain of cervical glands, and thence into the jugular trunk which, with the lymph from the subclavian, empties more or less directly into the vena cava. As the afferent branches come from the nose and tongue, the tonsils may become portals

¹ Laryngoscope, October, 1911.

² Ibid., June, 1911.

for indirect infection having its origin at those points. The tonsils also are intimately connected in situation with the tracts of respiration and alimentation and thus seem to invite contaminating influence. Further factors aiding systemic infection through the tonsils are: The degenerative processes tending to obliteration of the tonsils; the thin epithelial covering, without ciliated cells, and the tonsillar crypts communicating with the buccal cavity.

A number of cases are reported which, beginning with tonsillar infections, ended with serious and some fatal results. Of the 2 fatal cases, 1 began with sore throat and general malaise, temperature and pulse normal. The mucous membrane of the fauces and pharynx was congested. The peritonsillar tissue was swollen, but there was no peritonsillar abscess. The mucoserous exudate showed the presence of streptococci and staphylococci. The same microorganisms were found in the spinal fluid when the diagnosis of leptomeningitis was made. Twenty-five days after the first symptoms developed, the patient died, after having evacuated through the mouth about a pint of pus, which at autopsy proved to have come from the lungs.

The second fatal case presented much the same symptoms at first, with general inflammation and edema of the pharynx and soft palate. The patient became entirely well for two weeks and then developed a peritonsillar abscess. Forty-six days later this patient died of a septic pneumonia, suppurative pericarditis, and some residual pus in the right pleural cavity, following a resection of ribs performed two weeks before death.

A third case progressed from acute follicular tonsillitis with extreme prostration and chills. Abscess of the hip developed early and was followed by empyema. This patient then made an uneventful recovery.

Urethritis following Tonsillitis. Guy L. Hunner¹ gives details of 11 cases in which urethritis followed tonsillitis in women. One case of inflammatory rheumatism and chronic bladder trouble resisted all treatment until the tonsils were removed, when the symptoms ceased. A second had chronic bladder symptoms for over two years, ceasing only with ablation of the tonsils. In one cases where there was a return of the bladder symptoms after amygdalotomy, Hunner suspects a paranasal sinus infection. A fourth case presented bladder symptoms for three years, ceasing immediately after removal of the tonsils. There are many cases of urethral stricture where the usual etiological factors, tuberculosis, stone, and tumors, have been excluded, and these Hunner attributes to probable tonsillar infection. If this is true, dilatation becomes useless until the tonsils are removed.

Indications for Tonsillectomy. Eugene A. Crockett² believes that the tonsils should be removed in all cases where the child presents large,

¹ Journal of the American Medical Association, April 1, 1911.

² Boston Medical and Surgical Journal, March 23, 1911.

non-adherent tonsils largely filling the cavity of the pharynx, because of the obstruction in breathing that such cases present, and of their possible influence upon nutrition, and to secure the proper formation of the jaw at the period of second dentition. The tonsils should be enucleated in all cases associated with enlarged glands in the neck, and in all cases of articular rheumatism in which the tonsil is probably an etiological factor. These operations should, as a rule, be performed in a quiescent period, especially in the case of rheumatism, when the nervous shock and the additional sepsis should both be avoided in the acute stage. The existence of endocarditis in a more or less chronic state need not necessarily be regarded as a contraindication for operation. The tonsils should be thoroughly enucleated in all cases of repeated circumtonsillar abscess.

The tonsils should not be removed where they are of moderate size, that is, projecting not over a quarter of an inch beyond the anterior and posterior pillars. They should also not be removed under the promise to the parents that their removal will relieve the child of cold in the head or ear trouble. This may seem a self-evident proposition, but Crockett's experience is that the parent is frequently assured that the operation will relieve both of these troubles, which is a result not to be expected. In adults we occasionally see one or both tonsils very large, almost filling the pharyngeal cavity, with a history of repeated throat trouble in childhood, but with no throat infection for many years. Such a case, and it is a fairly common one, would be anything but benefitted by an operation. It should be remembered that the operative shock to the adult is very considerable. There is also the danger of hemorrhage, which is certainly a more considerable one in adults than in children. There is also the possibility, in cases of persons with a well-developed musical voice, that the voice may be permanently injured or they may have to change the whole musical method to obtain the same good results, so that even although some tonsils are distinctly pathological, Crockett does not advise their removal. With this exception his position is the same, as far as indications go, both for children and adults. He is sure that in doing an adenoid operation a great majority of operators remove all the tonsil tissue in the throat, regardless whether it is normal or abnormal in amount at the time the adenoid is removed. This is contrary to good surgical procedure. It adds a great deal to the amount of shock which the patient receives, and does not add anything to the success of the operation, although materially increasing the danger. The mere fact that the child is under ether for an adenoid operation should not be considered justification for the removal of tonsils if they are of normal size, and the case has no history of their infection. If the case presents a clear history of infectious process, such as circumtonsillar abscess, acute articular rheumatism or tuberculous infection of the neck, beyond question the whole

tonsil should be enucleated and removed as completely as possible. This should be done by blunt dissection rather than sharp dissection. In an ordinary case of simple hypertrophy devoid of symptoms, the most common type in children, it is not necessary to remove the base of the tonsil, but a perfect result may be obtained by removing enough of the tonsil to bring it down to a normal size, so as not to project beyond the pillars. This may be done with a snare or punch, or with the tonsillotome, if the operator is skilful in the use of that instrument. We should, however, guard ourselves against future trouble by warning the parents that it is possible for the child to have an acute infection of the nasopharynx without the existence of any demonstrable amount of tonsil tissue, although it is very much less liable to such infections than before the tonsils were removed. We should also, after this type of tonsil operation, keep the child quiet for several days, and particularly in cases of adults, warn the family that there is going to be a very sore throat.

A New Method of Tonsillectomy. A method of tonsillectomy by means of a guillotine and the alveolar eminence of the mandible, is described by Greenfield Sluder,¹ of St. Louis, which he claims moves the tonsil completely out of its normal bed in the upward and forward direction, and then utilizes one of the anatomic markings of the lower jaw as a vantage point in putting it through the aperture in the guillotine. This anatomical marking, which he terms the alveolar eminence of the mandible, is a well-defined prominence just above the mylohyoid line, and produced by the last formed molar tooth in its socket. In childhood the posterior unformed molar, as it lies embedded in the alveolus, helps to make the eminence.

The instrument used is a modification of the Mackenzie or Physick guillotine. It consists of a handle joined to the shaft at an angle of 115 degrees. The aperture at the distal end of the shaft is elliptical, with its long axis transverse to that of the shaft. The dull blade is pushed through the tonsils by the surgeon's thumb.

In this operation it is advanced that the tonsil, having been moved forward and upward out of its normal position, can be easily engaged by the aperture with the blade at its base; the alveolar eminence being used as a fixed point upon which the tonsil rests while the instrument is being adjusted. This is accomplished by pressing the tonsil against the prominence.

Examination of the specimen reveals that a little of the free edge of the anterior pillar, including a few fibers of the palatoglossus muscle is attached to it. Sluder does not object to this because he "always removes this bit of the anterior pillar with the tonsil," insisting that "it leaves a more open wound and a more open fossa when healed."

¹ Journal of the American Medical Association, March 25, 1911.

Another advantage claimed in removing this edge of the anterior pillar is that the tension of the resulting scar will begin at a point anterior to and below what would otherwise be the case, which tends to draw the palate forward and downward, this being advantageous in cases of Eustachian tube irritation. Further claims for the operation are:

1. That it does not require a volsellum and pulling it out.
2. That the embedded tonsil is as easily and quickly removed as the protruding one.
3. That no loosening of the pillars is required.
4. That a tonsil may be removed in its capsule in from five to eight seconds.
5. That the shock from this method is less than from the longer operations.
6. Stumps from previous operations are usually as easily removed as the original tonsils.

Actinomyces in Tonsillar Crypts. In examining sections of the tonsils removed from 100 patients, mostly children, Grosvenor¹ found the actinomyces in the crypts of the tonsils from 14 cases. Here the fungi increase in number and size, crowding aside the walls of the crypts, and, by their irritation, stimulate a great proliferation of the lining epithelial cells, with finger-like columns or masses of cells crowding into and even surrounding islands of lymphoid cells. This proliferation of epithelium forms a bulwark of protection against the invasion of the actinomyces into the tonsillar tissue. Immediately surrounding the fungi in the crypts are found many groups of swollen leukocytes, with granular or fragmented nuclei. Such were the findings in the study of a large number of sections from the tonsils of the 14 cases.

A Simple Method for Relief of Odonphagia. Some time ago Howell claimed that relief of laryngeal pain may be secured by firm pressure on the ears and mastoid region in swallowing. P. T. Hald,² Copenhagen, tried this method in 33 cases of inflammatory diseases of the tonsils and their surroundings. In 24 cases pain was considerably relieved by pressure against the tragus, or against the upper part of the mastoid. Tragus pressure was most efficient. He explains the process by supposing that it exercises a strong counterirritation of the skin area, whose sensitive nerve supply is in intimate relation to the sensitive nerve supply of the diseased tonsil. He limits the area to the lateral portion of the posterior meatal wall.

Relation of Tonsil Operations to Soft Palate and Voice. The causes for the belief that the removal of the tonsils in some way results in impairment of the voice, are discussed by G. Hudson-Makuen.³ He

¹ Laryngoscope, March, 1911.

² Medical Record, February 25, 1911.

³ New York Medical Journal, August 5, 1911.

shows that normal tonsils are in no way prejudicial to phonation, but, on the contrary, they may be helpful both in directing the action of the neighboring muscles and in modifying the resonance of the oral cavity. Hypertrophied tonsils, on the other hand, are distinctly prejudicial to phonation, because they interfere with the action of the muscles, they deflect the vibrating column of breath, and impair the normal resonance of the oral cavity. Degenerate tonsils are prejudicial to phonation primarily because they are prejudicial to health, and secondarily, because they interfere with the action of important vocal organs, by setting up a catarrhal condition in the oropharynx, which results in hypertrophy of the faucial pillars, the plica, and the capsule, and in numerous inflammatory adhesions binding all these parts together in one conglomerate mass. The two important indications for the tonsil operation are, to remove foci of infection and to increase or restore the functional efficiency of the respiratory, phonatory, and articulatory organs; and the operation that fails to meet the requirements of these two indications is more or less of a failure. The tonsil that requires removal is always prejudicial to vocal excellence. Makuen is firm in his claim that the popular belief that the removal of tonsils is injurious to the voice is well founded, and it is due in large measure to careless or bad surgery.

The Tonsils and Tuberculosis. With the view of determining the relationship between the tonsils and tuberculosis, Sewall¹ made a histological examination of 772 pairs, or 1544 individual tonsils. Thirty-nine of these sections, representing 31 pairs of tonsils, were pronounced to be tuberculous. This gives a percentage of tuberculous tonsils of 6.2.

Sewall also considers the influence of the infected tonsils upon the cervical glands, based on this material. He was able to follow up 160 patients who had been operated upon. Sixty-eight of these patients had enlarged glands, varying from slight enlargement, of probably benign character, to extreme tuberculous condition with softening, fistulas, etc. Of these 68 cases, the glands subsided in 57 cases and have not enlarged again. In 3 of these 57 cases, the glands and tonsils were both tuberculous; the first was diagnosed by an examination of the tonsil and some of the glands which were removed prior to the tonsillectomy; the second was diagnosed from the presence of a cold abscess, opened at the operation on the tonsils; the third from the character of the very considerable swelling which subsided immediately on the removal of the tuberculous tonsil. This leaves 11 of the 68 cases with enlarged glands to be considered.

In 6 cases, glands, enlarged before the operation, went down, but subsequently enlarged. He has a complete record of only 4 of these 6. In the first case the tonsils were not tuberculous. The patient was operated on later in the surgical clinic; the glands were quiet for one

¹ Journal of the American Medical Association, September 9, 1911.

year and then enlarged again. In the second case the tonsils were tuberculous, and fluctuating glands were opened at the time of tonsillectomy. They have since enlarged frequently. In the third case the tonsils were not tuberculous; the glands were undoubtedly tuberculous. They went down slowly after the operation until six months later; then they swelled, and a painless abscess formed that was opened. This healed, and the patient's health at present is good. In the fourth case the tonsils were tuberculous; the glands were enlarged before operation, but went down slightly some months later. Suppuration occurred; they were removed and showed histologically tubercles. The present condition is good.

In 2 cases the glands were enlarged before and did not go down after operation. In the first of these cases the tonsils were not tuberculous; the glands remained swollen after operation; have never broken down. In the second case the tonsils were tuberculous. Tonsillectomy had no effect on the swelling of the glands. The glands were removed in a surgical clinic six weeks later. At present the cervical glands are still enlarged.

Three cases, in which there was slight enlargement before, present the same picture. The tonsils in these cases were not tuberculous.

To summarize 160 cases: 92 had no enlarged glands; 68 had more or less enlarged glands; 57 of these went down permanently; 6 went down and enlargement recurred; 2 which were enlarged before operation did not subside; 3 were slightly enlarged and are now.

1. It will be seen from the above records that quite a large percentage of the children had enlarged glands, but many of these were only slightly swollen.

2. Practically all of the glands giving trouble have been associated with tuberculous tonsils, or were tuberculous at the time of the removal of the tonsils.

3. That the removal of the tonsils worked in a beneficent manner is shown by the fact that often the swollen tuberculous glands subsided, though not always permanently.

4. That certain tuberculous glands are not associated with tuberculous tonsils is of especial interest. We believe that tubercle bacilli can travel to the glands without damage to the tonsil, and this accounts for the following facts (also for the higher percentage of tuberculous glands):

5. Glands once tuberculous, associated with tuberculous tonsils or not, may enlarge even after the tonsils have been removed.

6. We find tuberculous glands more often than we find tuberculous tonsils.

7. Even when there is a reappearance of the swelling, the glands show more of a tendency to heal and the individual to enjoy health after the tonsils have been removed.

THE LARYNX

Papilloma of the Larynx. A very unusual case is reported by Carter,¹ showing the following interesting features: It gives the natural progress of papilloma of the larynx, beginning in infancy and continuing undisturbed by treatment up to the age of forty-seven years. The fungoid appearance of the growth was very unusual, no similar case having been recorded. The subsequent history will also be of interest, whether the patient develops a speaking voice and whether there is a recurrence of the growth. The latter, Carter believes, is unlikely, as the growths were thoroughly removed, and the patient has passed that age when there is a tendency to warty developments. The larynx before operation was almost completely blocked by fungoid papillomatous masses, the largest of which, attached to the left side of the larynx, acted like a ball-valve and caused almost complete obstruction on inspiration. The edematous condition of the surrounding tissues gave the impression of an active inflammatory process.

It is also worthy of mention that these extensive growths were all removed endolaryngeally. Carter regards the endolaryngeal operation as the ideal one in these cases, and can scarcely conceive of a case of papilloma of the larynx justifying thyrotomy. In operating, he prefers the snare to any other instrument for the reason that the growth can be removed more accurately, more thoroughly, and with far less injury to the surrounding healthy parts. The latter is most important, for it is the common observation of laryngologists that recurrences are more apt to spring from those portions of the larynx that have been injured during the operative procedures than from the bases of the primary growths.

Laryngeal Papilloma in Children. Broca and Roland² expatiate upon the fact that there is no good method of treatment for these laryngeal growths, ensuring against recurrence and leaving the voice normal; the only choice is to determine the best technique. If there is dyspnea and much wheezing, tracheotomy may be required; it is well to wait for a time after this, as the tracheotomy may eventually lead to the shrivelling of the growths. They come and go in the arbitrary and mysterious manner of warts on the skin. Removal of the growths through the mouth, under direct visual inspection, is, of course, the preferable method, and can generally be done after the age of four or even a little earlier. But it usually required more than one operation; the operations must be repeated during months or even years. Tracheotomy may finally become necessary, even then, if the growths sprout again and there is much obstruction of breathing. Exception-

¹ Laryngoscope, February, 1911.

² Revue de Chirurgie, Paris, March, 1911.

ally, thyrotomy, or better, perhaps, thyrostomy, may be found preferable. Even after tedious treatment by these various techniques, stricture of the larynx may compel laryngostomy. There is always the hope that the papillomata may shrivel spontaneously, however, as the child outgrows the tendency. They sprout as if growing from seed sown by the primary growth, and behave in the larynx much the same as in the bladder. In addition to the danger of suffocation from the growth of the laryngeal papillomata, there is danger of a suddenly fatal inhibiting reflex. The prognosis of papillomata in the larynx is more serious in children than in adults, as the lumen is smaller, and as children are more liable to warty growths. Spontaneous expulsion and cure was observed by Bruns in 3 of 48 cases he has compiled; over half the children died before the age of three, and only 5 reached the age of ten years without operation. The spontaneous subsidence of the papillomata may explain these cures in some of the cases, and the possibility of this justifies expectant treatment for a reasonable time after tracheotomy. Warts on children's hands sometimes subside after the children have taken a little magnesia, and this treatment has been suggested for children with papillomata in the larynx, hoping thus to favor spontaneous retrogression or to aid the retrogression which may follow opening the trachea.

Singer's Nodule. F. V. Laurent¹ says that while these nodes usually occur in singers and public speakers, habitual misuse of the voice by anyone may cause this condition. While faulty breathing is a factor, the breathing of itself will not develop nodes, the prime factor being overtension of the intrinsic and extrinsic muscles of the larynx. He emphasizes the fact that the main treatment of chorditis nodosa is teaching the patient to use the voice and respiratory apparatus properly. This appears to be a much more satisfactory method than operative measures, as, in the latter case, the node will probably reappear in time, while if the patient has learned to use the voice properly, the cause is removed, and there is no danger of recurrences.

Etiology of Cancer of the Larynx. Scanes Spicer² advances the theory that the sites of initiation and of maximum development of laryngeal cancer are determined by the mechanical interaction of the rigid resistances of the laryngeal endoskeleton, on the one hand, and certain cell constituents (epithelial and fibrous) of the soft tissues (mucous membrane) on the other.

If in an animal with an endo-skeleton, *i. e.*, a vertebrate, certain muscular actions are, from any cause, habitually exaggerated, the corresponding rigid resistances and soft tissues are reciprocally influenced in such a way as to cause undue stress, strain, or friction of those soft tissues, *i. e.*, to produce a chronic, intrinsic, mechanical irritation of

¹ Journal of the American Medical Association, September 30, 1911.

² Journal of Laryngology, Rhinology, and Otology, London, January, 1911.

the latter. The result is, under certain conditions of nutrition, warmth, moisture, senescence, onsolescence, etc., to stimulate an excessive and disorderly growth of the epithelial, endothelial, or connective-tissue cells entering into their structure. The association of the local irritations of extrinsic and palpable origin, such as the pressure of a clay pipe, rough tooth plate, smoking, paraffin soot, betel-chewing, Kangri stoves, and injury, with the starting of cancer is widely accepted. The sharp tooth irritation cause of cancer forms a natural transition to the view now put forward that hitherto unsuspected intrinsic irritations are even more frequent and potent causes of the initiation of cancer, and this is not only in the larynx, but throughout the body. The sites of preference for the commencement of cancer, whether in the gullet, stomach, intestinal flexures, rectum, breast, skin, uterus, etc., are found to be those sites at which the resultant of excessive mechanical forces chronically impinge or act, and where, normally, there is no provision for escaping the consequences of such excess. This is seen if the springy joints, elastic lungs, and contractile muscles, which are little liable to primary cancer, are compared with such areas as the region of the cricoid excursion, the esophageal gastric junction, and the rectum opposite the coccyx, where various rigid resistances and soft tissues undergo relative changes of stress and position with reference to each other, with often excessive force.

The chief muscular mechanisms concerned in producing undue tissue stress, strain, and friction are believed to be: (1) The motor mechanism for maintaining equilibrium in posture; (2) that for respiration, and (3) that for digestion; but important factors arise in the relative displacements and mutual pressures of the internal movable organs constrained in part by mesenteries and ligaments, and also from the artificial compression of the trunk by corsets.

Faulty postures and mode of breathing in man, whether from habits, occupation, imitation, intestinal derangements, or other causes, bring about persistent portal congestion, intestinal stasis, and general auto-toxemia. This is especially seen in marked types of belly-breathing, in which habitual inspiratory descent of the diaphragm takes place, with no expansion of the base of the thorax by the muscular mechanism of respiration.

Such abnormal muscular action of the diaphragm tends to produce, simultaneously but independently, two things: (1) Abnormal increase in intrinsic mechanical strains and irritation, causing cell overgrowth at sites of impact or restraint—*e. g.*, the inspiratory pulling down of the cricoid; (2) through relatively lessened thoracic suction, chronic portal congestion occurs, leading to intestinal autotoxemia, general blood cachexia, and hence wasting of the tissue at large.

The central nervous system, through the deep afferents and visceromuscular reflexes, endeavored to coördinate the motor mechanisms so

as to minimize undue strain and to adjust the deranged thoracic and abdominal functions, but under the influence of the chronic auto-toxemia, or perhaps from the emotional depression of sorrow, grief, or worry, sooner or later the higher coördinating centres strike work and the mechanical and portal derangements run further riot.

In this way the biological syndrome of cancer in the working of the human machine is believed to arise. The power wasted in undue stress, strain, and friction appears to be converted into the energy of those unknown complicated chemical and physical constructive processes concerned in cell growth and multiplication—a marked contrast to those destructive results of similar forces on the material substance of a non-living machine in causing wear and tear.

In general terms, Spicer suggests that cancer is the manifestation of a specific biological conjunction, pathological syndrome, or symptom-complex of deranged processes in the working of the body, which processes are: (1) Neoplasia from chronic irritation of either extrinsic or intrinsic origin; and (2) a faulty constitutional state or blood cachexia, produced as above. He claims that his theory affords a rational interpretation of the natural history of cancer of the larynx. It is in agreement with the age, sex, and site-incidences, the left side predominance, the obscure commencement, the diffuse deep origin, the persistent hoarseness, the early vocal cord paralysis, the relative greater extent in the depths than on the surface, and, finally, the success of the laryngofissures and removal of diseased parts.

Treatment of Cancer of the Larynx. In reviewing the progress in the treatment of laryngeal carcinoma since the organization of the American Laryngological Association, J. Solis Cohen¹ says that in 1878 the treatment of laryngeal carcinoma was mainly symptomatic. The chief surgical features in advanced cases comprised, on the one hand, prophylactic tracheotomy to secure respiration and avert suffocation, and on the other, removal of exuberant masses with forceps or with curette, to facilitate deglutition. In cases of minute dimensions the general practice was to remove the growth intralaryngeally with forceps or curette and cauterize the base; or to destroy the growth with the electric cautery. The medicinal treatment was symptomatic save for the systematic administration of arsenic, then considered to have some effect in retarding the progress of carcinoma.

Nevertheless, serious attempts at radical procedures had been employed for a number of years. Thus, in cases of limited and fairly circumscribed dimensions, a number of surgeons preferred to split the larynx in front, stretch the wings of the thyroid cartilage asunder, and then dissect the growth out with a zone of apparently healthy tissue, and cauterize or scrape away the tissue from whence the growth had

¹ *Laryngoscope*, July, 1911.

been removed. This, with certain technique modifications, still remains the best method of treating intralaryngeal carcinoma of moderate dimensions, although it was unappreciated for many years. In large growths seriously involving the larynx, and, in some instances, adjacent structures, occasional operations had been performed, removing the entire larynx or considerable portions of it, and sometimes with more or less extensive portions of surrounding invaded structures. In those early days, however, despite an occasional example indicative of absolute success, the majority of cases thus treated perished from causes directly attributable to the operation and its sequences, so that it was very doubtful whether the slight gain in the few successful instances compensated for the absolutely loss of life in the many more who perished prematurely as the result of the interfering procedure. For many years statistics of published cases proved the truth of this statement.

As the technique of operation and of the postoperative handling have become more thoroughly improved, this discrepancy has largely disappeared, and for some years we have confidently anticipated satisfactory results in the majority of cases, provided they have been properly selected. If improperly selected it is still far better that radical measures be avoided and that symptomatic treatment be adopted, with precautionary tracheotomy as requisite.

A practice has arisen in cases of moderate dimensions, to split the larynx, and destroy the growth bodily by one of the electric procedures—electric, cataphoretic, fulguric, Röntgenic, and even by radium; but these methods are incomparably inferior to the knife or the scissors. Two of the great dangers that threatened success after satisfactory performance of an operation for carcinoma of the larynx were recurrence of the neoplasm in all cases, and mechanical or surgical pneumonitis in cases of absolute excision of the larynx. The danger of recurrence has been lessened by the dissemination of laryngology among the profession, rendering it every day more likely that the lesions will be recognized long before they become unamenable to treatment, so that they can become eradicated while still limited in extent and easily accessible. It has been lessened by taking advantage of the fact that cartilage long resists the ingress of epithelioma, so that comparative immunity from recurrence *in situ* may be secured by thyrotomy, removal of the growth, and a healthy zone of tissue raised up in mass after stripping the perichondrium from the cartilage with a blunt dissector. This is far better than the earlier plan of cutting away the growth and then scraping tissue down to the perichondrium, or deep cauterization of the surface from which the growth has been cut.

Another procedure similar in conception and in intent applicable to more extensive lesions, but which has not yet received much consideration, consists in removal of the entire respiratory portions of the

larynx, leaving the undiseased thyroid cartilages undisturbed to perform their functions as shields.

As regards the dangers from septic pneumonitis, these have been largely eliminated in complete laryngectomy by adopting a device consisting in cutting the trachea loose from the larynx and fastening it in the front of the neck, thus cutting the respiratory tract off entirely from the alimentary tract, and avoiding the escape of food into the air-passages, while at the same time it renders unnecessary the use of a tracheal cannula.

Cancer of the Larynx; Extirpation of Primary and Secondary Growths; Glandular Recurrence; Treatment with Thyroid Extract; Disappearance of Growths. Robert H. Woods¹ reports this remarkable case. The patient, a man, aged fifty-one years, came complaining of pain and difficulty on swallowing of two months' duration. A large ulcerated growth was found involving the right side of the larynx extending toward the pyriform sinus. No history of syphilis. Microscopic examination of a portion of the growth showed it to be a flat-celled carcinoma. Extirpation of the larynx was resolved upon. An autogenous vaccine of *Staphylococcus albus* and *aureus* with streptococci was administered as a preliminary to operation. Laryngectomy on November 27, 1909. Recovery was retarded by severe hemorrhage from near the base of the tongue between the fifth and twelfth days after operation, and by sluggish healing on the part of the external wound; granulations failed to form, the sutures cut out, and the tissues around the wound ulcerated away. Later on healing progressed rapidly, and the parts cicatrized, leaving, however, as a result of the breaking down, a fistula between the trachea and the esophagus. Attempts to close the fistula having failed, Woods attached an inflatable rubber covering on the tracheotomy cannula, and this, inflated before a meal, blocked the opening so that the patient was able to swallow. At other times the existence of the fistula rendered it possible for the patient to speak "with quite a good voice." The glands over the right carotid sheath were removed on January 29, 1910. Examination showed that they were cancerous. No recurrence appeared until October 19, 1910, when a hard lump was felt on the right side of the neck at the level of the carotid bifurcation. Operation on October 22, showed the growth to be so extensive that removal was out of the question. A portion removed for microscopic examination proved to be cancerous. Upon the suggestion of Sir Charles Ball, thyroid tabloids, gr. iij, three times a day were tried. On November 22, a fluctuating swelling to the right of the tracheal opening was incised, and some curdy, whitish matter (not pus) was let out. This wound gradually closed, but the material accumulated again, and the swelling was again opened. In the first week of January, 1911, it closed finally.

¹ British Medical Journal, July 1, 1911.

On January 24, 1911, it seemed to Woods that the glandular tumor was rather smaller. A month later this had become unmistakable, and the patient expressed himself as free from pain which had previously been troubling him. The tumor continued to diminish, and six months after the thyroid treatment had been started "no evidence of tumor could be felt." Sir Thornley Stoker then saw the patient in consultation, and the thyroid treatment was continued. Woods notes that the only cases in which this treatment has been successful have been lymphatic recurrences after extirpation of the primary growth.

Diagnostic Importance of Laryngeal Paralysis. II. Grabower¹ insists that examination of the larynx is as important as that of the fundus of the eye in all nervous affections, and should be a routine procedure. Paralytic conditions in the larynx may exist without causing appreciable symptoms; they may even be the earliest sign of tabes dorsalis, and possibly permit effectual treatment before irreparable lesions are installed. The laryngeal disturbance with multiple sclerosis may be merely a tremor of the vocal cords or a twitching movement, but laryngeal symptoms deserve to rank as a diagnostic measure with nystagmus and temporary blanching of the papilla. Paralysis of the larynx is, further, characteristic of syringomyelia, especially unilateral recurrent paralysis. Grabower's research has shown that the posterior crico-arytenoid muscle has only 230 nerve fibers in comparison with the 680 fibers of the inner portion of the thyro-arytenoid muscle; it is thus less resistant, and becomes paralyzed more readily. As tuberculosis frequently begins in the bronchial glands, and these compress the recurrent laryngeal nerve, paralysis of the posterior crico-arytenoid muscle controlling the vocal cords may be observed in the very earliest stages of incipient tuberculosis. The right recurrent nerve is more liable to be compressed in this case than the left, as the right bronchus is higher than the left and thus closer to the right inferior laryngeal nerve. The left is more liable to suffer from compression by aortic aneurysm, as the left nerve encircles the arch of the aorta, and is thus liable to be compressed quite extensively. The right inferior laryngeal nerve may be compressed with an aneurysm in the subclavian artery. Enlargement of the thyroid may also compress this nerve, and signs of paralysis in the larynx indicate extension of the goiter into the depths. The same is true of tumors in the esophagus, the posterior crico-arytenoid muscle feeling the effects first but the rapid growth of the carcinoma soon involving the recurrent laryngeal nerve. Another cause of peripheral paralysis of the recurrent nerve is a healed inflammatory process in the right apex of the lungs. Nerve substance may be found embedded in the cicatrix at necropsy; there probably had been recurrent paralysis during life, causing moderate hoarseness for

¹ Berliner klin. Wochenschrift, April 10, 1911.

which no cause could be discovered. The hoarseness may have subsided, and yet the unilateral recurrent paralysis must have persisted throughout life, the sound vocal cord vicariously acting for the paralyzed one. The right inferior laryngeal or recurrent nerve passes close to the right apex of the pleura, and is thus naturally drawn into the retracting cicatricial tissue as the inflammatory process in this region heals. Mitral stenosis is sometimes accompanied by paralysis of the left recurrent nerve. In regard to laryngeal paralysis with brain tumor, he says that unless the medulla oblongata is investigated, the examination cannot be regarded as complete. Among other symptoms in the larynx mentioned, is the twitching of the vocal cords liable to be noticed with a tumor in the frontal lobe. Twitching of the vocal cords, Grabower states, is presumptive evidence that the tumor is in the base of the frontal lobe and that it is actively growing.

Laryngeal Symptoms of Myasthenia Gravis. A case of myasthenia gravis, in which the first symptoms of the disease appeared in the throat, was presented at the Laryngological Section of the Royal Society of Medicine, by Somerville Hastings.¹ The patient, a boy, aged fourteen years, was first brought to the Middlesex Hospital in July, 1910, complaining of difficulty of breathing and swallowing. His mother said that for the last two months he had regurgitated fluids through his nose when drinking, and that she had found an increasing difficulty in understanding what he had to say, especially toward night. He had not suffered from sore throat. When examined about this time, the vocal cords were seen in the cadaveric position, and were almost stationary. The boy was unable to cough, and articulation was defective. The soft palate moved very slightly, and there was some congestion of the mucous membrane of the nose, but nothing in the nasopharynx. The knee-jerks were normal.

On October 4, 1910, he was sent into the hospital, and seen by Dr. Voelcker, who diagnosed myasthenia gravis. It was then noted that the palate became completely immovable after the patient had said "Ah" some half dozen times. Lateral nystagmus also appeared after repeated movements of the eyes. The boy was unable to screw up his eyes or wrinkle his forehead, and the facial muscles generally were very weak, and showed the "myasthenic reaction" to electrical stimulation. The muscles of mastication and those of the trunk and limbs were quite normal. The thymus was not enlarged. The patient improved a great deal while in the hospital, and when last seen on November 25, was much better. The laryngeal condition had especially improved, and the cords came together fairly well. He was still unable to whistle, and could not completely close his eyes. The soft palate hardly moved at all.

¹ Journal of Laryngology, Rhinology, and Otology, London, January, 1911.

The Larynx in Paralysis Agitans. In a series of 80 cases of paralysis agitans coming under the observation of Graeffner,¹ repeated laryngoscopic examinations gave the following results: 40 per cent. showed no tremor of the vocal cords. In 21 cases (26.25 per cent.) there was tremor which was synchronous with the general tremor, while 27 patients exhibited a tremor of the cords which was not synchronous with the latter. These figures do not differ notably from those obtained by others with large material. A synchronous tremor of the cords is not an integral feature of paralysis agitans. All phases of action of the cords, adduction, abduction, etc., were represented.

Neuralgia of the Larynx. H. Kahn² reports 5 cases of non-ulcerative laryngitis dolorosa. He describes laryngeal neuralgia as being a painful, non-ulcerative disease of the larynx, characterized clinically by more or less intermittent or constant pain, painful areas, dyspnea, dysphagia, disinclination to talk, and fear of approaching death.

Endobronchial Treatment of Asthma. Out of a total of 11 cases of asthma treated endobronchially by Freudenthal,³ 8 are considered as cured, 3 greatly improved, and 2 showed no benefit whatsoever. The bronchoscope was used by Freudenthal not only for treatment purposes, but to note the pathological condition present. In one case there was apparently a constriction of the trachea, which could not be overcome at the first bronchoscopy. The whole lumen was swollen and closed, and could not be dilated by cocaine. He believes that this was one of those cases of spasm of the trachea described by Bruegelmann, which he considers to be due to an irritation of the respiratory centre. In the bronchi, such a spasm could be seen more often, but it generally disappeared after the application of cocaine. This could be observed endoscopically, not alone by opening up the bronchus, but by the action of the muscular apparatus afterward. The ulceration found in one case has been described previously, and so far is the only one on record. In all cases he used bronchoscopy under local anesthesia. He invariably kept the patient in the upright position. These sittings were made in the morning on an empty stomach, whenever possible. Some pain always followed bronchoscopy. In some cases, it lasted three or four days, in others only a few hours.

A New Method of Passing the Bronchoscope. A new method of passing the bronchoscope in the straight position is described by Johnston,⁴ which he states has worked admirably, and has proved so easy that the work has become a pleasure. The method is as follows:

The patient is placed on the table with the head in the normal straight position. A general anesthetic is administered. The modified direct

¹ Berliner klin. Wochenschrift, September 18, 1911.

² Chicago Medical Recorder, April, 1911.

³ New York Medical Journal, June, 1911.

⁴ Maryland Medical Journal, June, 1911.

laryngoscope is passed straight down between the incisor teeth, and when the epiglottis comes into view the spatula end of the instrument is hooked behind it. By making slight pressure on the upper teeth the epiglottis and base of the tongue are pulled up and the larynx opened for inspection. A weak solution of cocaine is now applied to the larynx through the tube to prevent reflexes. With the laryngoscope in position, the bronchoscope is passed through it to the vocal cords. With the eye fixed on the end of the smaller tube, a slight twisting motion is used, which sends the bronchoscope between the cords. The breathing is now distinctly tubal in character. The laryngoscope is removed, and the head of the patient gently lowered over the end of the table. The examination is now proceeded with as in the extended position. In the above procedure, the operator stands to the left of the patient, and uses the laryngoscope in the left hand. Both direct laryngoscope and bronchoscope are easier because the muscles are relaxed.

DEFECTS OF SPEECH

Obstructions to Speech Development. This most interesting and important subject is discussed at length by G. Hudson-Makuen,¹ who says that the chief obstruction to the normal development of speech is deafness, because hearing is absolutely essential to the natural and automatic development of the cortical speech centres. The functions of the ear, therefore, should be carefully guarded, and every possible means should be employed for their development, because even a little hearing is better than no hearing at all.

Deformities of the mouth, pharynx, and nose, as well as those of the larynx and the respiratory organs, are in themselves prejudicial to normal speech development, and they are frequently the direct cause of the various diseases of the ear, which result in hardness of hearing, and oftentimes in deafness. Deafness is the chief obstruction to speech development, because it interferes with the normal cerebral development, and speech itself is more cerebral or cortical, than peripheral. That is to say, if the speech centres in the brain are normal in their development and action, fairly good speech may be produced with very imperfect peripheral mechanisms. Intelligible speech has existed, for instance, after the complete removal of the tongue, and even of the larynx, and a cleft palate affects the speech only to a certain limited degree.

So much is speech a product of the brain that the articulatory muscles have been called the mental muscles. Good speech cannot issue from a brain diseased, but it is the result of the fullest development of the

¹ *Laryngoscope*, October, 1911.

higher intellectual centres of the brain. The lower speech centres can work effectively in the externalization of speech only when they are controlled by other and higher centres situated in the forebrain. Feeble-mindedness, therefore, imbecility, and idiocy are incompatible with good speech development, because without normal intellectuality and mentality there can be no normal development of the lower centres and peripheral organs of speech.

All speech training, therefore, whether the defects be on account of deafness or on account of the thousand and one other things that may impede its development, must be carried on simultaneously with psychical training. Speech training consists, after all, only in an effort to help the individual by means of the development of the higher intellectual centres of his brain, himself to control and train his lower speech centres, and thus, through them, the peripheral mechanisms of speech. All children should have a certain amount of speech training, and thus not only would the expression of thought be placed upon a higher plane, but that portion of the brain which manufactures thought would be itself more highly developed.

Treatment of Stuttering. Aronsohn¹ explains stuttering as a psychological infirmity. These individuals are generally morbidly afraid of laying themselves open to ridicule, and consequently they strive to suppress emotional stress on what they are saying. Treatment should be along psychological lines. It is irrational to try to train the muscles to coördination when the trouble is in the mind and not in the muscles. The main point is to teach the individual to think simply and to express himself simply and genuinely, paying no attention to the way he speaks. Reading exercises are useful adjuvants except when the patient does not stutter when reading aloud.

According to Scripture,² the curative treatment of stuttering is based on the following principles: The "principle of a new method of speaking," is founded on two facts; (1) that the stutterer always speaks in an abnormal voice, which we may call the "stutter voice," and (2) that he does not stutter when he expresses his ideas in any other voice, such as the singing voice. When the stutterer tries to express a thought in his usual way, the action of his speech is interfered with by the emotional condition, embarrassment, or fear, that is aroused at the same time. He therefore speaks in his stutter voice. If he tries to express the thought in any other way than the usual one, the emotional disturbance does not arise. This explains the familiar fact that the stutterer never has any trouble when he sings what he wants to say.

The stutterer can at any time speak without stuttering if he will use an abnormally low voice, or an abnormally high one, or if he will drawl the vowels or slur the consonants, or again, if he will speak in a choppy

¹ Berliner. klin. Wochenschrift, January 23, 1911.

² Journal of the American Medical Association, April 22, 1911.

staccato voice, and so on. These are the methods of the "stammer-schools" and "stutter-cures." They are objectionable because they leave the patient with a queer voice; people tell him that the cure is worse than the disease. The patient usually gives up the queer voice after a while and becomes a stutterer again, because the queer voice itself produces embarrassment, and he naturally feels like discarding it.

The essential point is that the stutterer should feel his acquired speaking voice to be different from his stuttering voice. One patient could never dictate to his stenographer. It was found that he could not distinguish one note from another in music; so he was told to sing what he wanted to dictate. He did so without the slightest hesitation or difficulty, in what he supposed to be a singing voice; it did not differ, however, from his usual voice, except in being slightly easier and more natural. As long as he thought he was singing he did not stutter, although he did not really sing. The cure was a failure because he refused "to make a fool of himself by singing to his stenographer." To inform him of the fact that he did not sing would have made him a stutterer again. There was no way out of the dilemma.

There is another way of speaking which is unusual to the stutterer, namely, the way in which normal persons speak. When he speaks in this way, he does not and cannot stutter. The therapeutic procedure on this principle will, therefore, be to teach him to speak normally. The various abnormalities will disappear when the patient has thoroughly learned the exercises given.

The "principle of habit-formation" implies that the new way of speaking is to be drilled into the patient until it becomes a habit. The "principle of spontaneity" is requisite because, when the patient has learned to repeat perfectly, he will still be unable to do so when he speaks of his own accord. A gradually increasing amount of spontaneous speech is introduced into the treatment.

The "principle of increasing embarrassment" arises from the fact that, even when the patient has learned to speak perfectly in the presence of the physician or the instructor, he is unable to do so under other circumstances. The patient is taught to speak properly before a few persons or before a class. Still more difficulty is introduced by making introductions, speaking over the telephone, buying in stores, reciting in school, etc. For the introduction exercise, the stutterer practices at first privately, and then with a gradually increasing number of strangers.

The "principle of correct thinking" indicates that the abnormal habits of thought, which a stutterer always acquires to a greater or less degree, are to be corrected by appropriate exercises. A frequent abnormality is that of getting into a daze at each effort to think. The patient finds that he cannot decide promptly. It was typical of one patient that on being asked, "Which kind of dog do you like best?" he

hesitated and grunted, and finally said, "I really cannot say which I like best." He was cured by being obliged to give some kind of decision quickly, regardless of whether it was correct or not. The trouble was due to the mental flurry or daze that had become a habit. Another patient, when leaving a house, found himself unable to say "Good-by" because some friends were waiting for him. The trouble arose from a conflict between the motive to hurry after the friends, and the motive of not offending the host; this produced a mental daze that left the patient speechless. A series of 15 exercises are given, which present an outline of the treatment.

In describing the treatment resorted to in these cases in Holland, van Baggen¹ says the first thing to do when treating a stutterer is to give him a rest. So the stutterer is forbidden to speak. Some do not stutter when they speak in a whisper. These are allowed to whisper, but not more than is strictly necessary. At the same time, exercises are given for the breathing, vocal, and articulating muscles. These exercises not only aim at the development of the muscles, but also tend to favorably influence the nerve fibers associated to the muscle. Therefore the exercises must be carefully chosen in such a manner as to produce a quiet, regular movement of the muscles by means of which all stuttering is excluded. After some days the patient is allowed to speak, in the beginning only in the presence of the teacher and only for a few moments. At a later period, when the patient does not stutter, the discourses are prolonged. These early conversations, during which stuttering must be carefully avoided, are for the specialist one of the most difficult parts of the cure. They require the exercise of the greatest tact in leading the conversation in such a manner as to prevent the patient from stuttering. When the latter has spoken fluently for some days with his teacher without any stuttering, he is allowed to converse a few moments with his family and friends. When we have succeeded so far, we generally notice a rapid progress. The patient regains his self-confidence, and the constant apprehension associated with his speech disappears; this has a favorable influence on the entire nervous system. When the cure is completed the patient must remain under the control of the specialist for some time, while also continuing the exercises with increasingly longer intervals. If there are adherent symptoms, the exercises for the breathing, vocal, and articulating muscles must be combined with slow, regular movements of the limbs. Those voluntary movements suppress the involuntary convulsions.

Van Baggen says that when treating a stutterer it is necessary to take into consideration not only the manifest symptoms of the disease, but also the temperament of the patient. The timid patient who suffers deeply from the humiliation entailed by his infirmity must be

¹ Medical Record, September 2, 1911.

dealt with in a manner different from that with which one deals with the heedless stutterer who feels only the irksomeness of his impediment. The spoiled, undisciplined child requires firmer management, while the bashful little stutterer must be approached with kindness. The success of the treatment depends much on a good understanding between the patient and the specialist.

Defective Mutation of the Voice. The change of the voice at puberty sometimes goes on improperly, and the young man acquires a high, falsetto tone instead of the regular tenor or base. The condition is very troublesome to the business man, and is particularly obnoxious in public speakers, clergymen, lawyers, and military officers. Scripture¹ describes the cause and treatment as follows:

An examination of the larynx in such a condition shows the vocal cords to be excessively shiny and white, and apparently very tightly stretched. An external examination shows that in speaking or singing the larynx is pulled high up under the tongue, and often rather forward toward the chin. The condition is evidently due to overcontraction of both the intrinsic and extrinsic muscles of the larynx, whereby the vocal cords are stretched too tightly. The overcontraction is found only during singing and speaking. It is a purely nervous habit.

The treatment begins by teaching the person to sing in very low tones. At first the tones will be harsh and rattling, but they will gradually become natural. The pitch of the song is gradually raised, until the patient sings over the normal range of voice. Another exercise consists of chanting sentences on a single low tone, which is gradually raised in pitch in successive exercises. A third exercise consists in singing the first word or two of a sentence on a low tone and finishing it by speaking. In a fourth line of work, exercises in singing and speaking are used while the patient presses the larynx down and backward by putting his fingers on the hyoid bone, and on the notch at the front of the thyroid cartilage. With such direct methods of treatment it is possible to eliminate the defect entirely, usually in a very short time. The cure is often completed in one or two weeks.

¹ Journal of the American Medical Association, February 11, 1911.

OTOLOGY

By ARTHUR B. DUEL, M.D.

Syphilis. Within the last decade, Schaudinn, Metchnikoff, Roux, Wassermann, Uhlenhuth, Hoffman, and Noguchi, by their indefatigable labors and painstaking research among the trypanosomes and spirochetes, have lifted the veil of darkness which for long years hovered over many well-known scourges of humanity. Particularly is this true of syphilis—always regarded as one of the most subtle and dangerous diseases. The Wassermann and Wassermann-Noguchi tests are now as much a part of our diagnostic armamentarium as are the usually employed examinations of blood, urine, sputum, or feces; and are as necessary, in many instances, for a positive diagnosis or as an indication for continuation or cessation of treatment.

With the certain knowledge of the nature of the disease, the exhibition of mercury, iodine, and arsenic in its treatment has been removed from the position of empiricism which it occupied (albeit so successfully) for ages. Hand in hand with advances in the knowledge of the cause of the infection, have been devised improvements in the agencies employed to combat it, and in the methods of their administration.

The account of the strenuous labors of Ehrlich and Bertheim in the development of a pharmaceutical product which could be introduced into the human organism in sufficient quantities to kill the bacteria ("parasitotropic") without being sufficiently toxic to injure the organism itself ("organotropic") is most fascinating.

Their investigations on animals revealed the fact that chemicals of great toxicity, when introduced into infected animals, developed both a toxic and bactericidal action. These same chemicals had no bactericidal, or a comparatively weak bactericidal action in test-tube experiments. The conclusion was inevitable that in the animal organism a reduction process took place, and that the secondary product possessed the bactericidal properties. The next forward step was made when these reduction processes were made outside the human organism, thus saving it from the harmful effect of the chemical reaction. The parasitotropic element thus separated from the organotropic could then be exhibited in sufficient doses to "sterilize" the whole system at "one stroke." The necessity for this complete sterilization was demonstrated from a practical as well as from a theoretical standpoint, since it was found that an insufficient dose, or several insufficient doses, produced a resistance in the bacteria which rendered them subsequently

immune to large doses (even lethal doses in the animals experimented on).

By a series of almost endless experiments, an arsenical preparation was at last produced which came as near the ideal of Ehrlich as it was thought possible; a preparation which could be exhibited in sufficient amount to completely eliminate the bacteria without at the same time causing any toxic effect. The preparation *salvarsan*, "606," brought to this stage of perfection, was given out, at first cautiously to a few, with careful recommendations as to the method of employment, and then, as experience grew, to the profession generally.

As would be expected, a tremendous literature has appeared reporting the experience of hundreds of men with different dosage and different methods of administration.¹

Many of the reported cures are little short of miraculous. Deeply interesting as these are to the profession, they are of special importance to the ophthalmologist and otologist, from the fact that secondary, tertiary, and congenital syphilis so often attacks the second and eighth cranial nerves. An added interest is lent to the subject from the fact that the question has already arisen as to whether the administration of salvarsan had not, in some cases, precipitated a sudden loss of function in these nerves.

One of the most important and searching inquiries into this subject is that of J. Benario (Frankfurt-am-Main) in a paper entitled "The Frequency, Causation, and Therapeutics of Neurorecurrence after Treatment by Salvarsan: A Statistical Inquiry."²

The paper is of particular interest to otologists, owing to the evidence of the frequent involvement of the eighth nerve in the early stages of syphilis.

He reports the collected statistics of 14,000 cases treated by salvarsan. Neurorecurrence took place in 126. Of these, 118 occurred in the primary or secondary stages, a very large proportion of them being in the early secondary stage. The recurrences took place in the second to the eighth cranial nerves in the following proportions: Auditory, 43 per cent.; optic, 26 per cent.; facial, 15 per cent.; the balance divided among the other four. The interest to the otologist is evident from the high percentage in which the auditory nerve was involved (51 out of 126). Of this number, the cochlear branch alone was involved 29 times; the vestibular branch alone, 5 times (3 times unilaterally); both branches simultaneously, 17 times.

The neurorecurrence occurred in 96 per cent. of the cases within four months after the administration of salvarsan; 40 per cent. occurring in the second month.

¹ Victor Koechl & Co., N. Y., in a little brochure called *Salvarsan*, have compiled the references to more than 1000 articles published throughout the world.

² Münch. med. Woch., April 4, 1911, No. 14,

Benario discussed at length the question of whether these neurorecurrences were due to the toxic effect of the arsenic, or to a syphilitic process. He called attention to the fact that, in the cases under observation, the careful study to which they were subjected rendered the neurorecurrence less likely to be overlooked, which might account for their seeming frequency. Ehrlich has declared that, in his opinion, they were always syphilitic, and with this view Benario agrees for the following reasons:

1. The length of time intervening between the administration of salvarsan and the neurorecurrence.
2. The irritative and inflammatory character of the nervous phenomena, as compared with the atrophic changes observed after the administration of other arsenical preparations like arsacetin.
3. The appearance of the affection in the early stages of syphilis.
4. When salvarsan has been given in other affections, the neurorecurrences have not appeared.
5. The manifestations have improved or disappeared under mercurial treatment, or another administration of salvarsan.
6. The neurorecurrences have almost invariably appeared in cases in which small or inadequate doses of salvarsan have been given.
7. Similar manifestations have appeared while mercury was being given.¹

Benario strongly supports the explanation offered by Ehrlich, viz., that the dosage of salvarsan has been insufficient; that isolated clumps of spirochetes in the sheaths of the cranial nerves have escaped the action of the drug, and have subsequently set up a perineuritis.

They are not sufficient in number to cause a general toxemia, or to give rise to a Wassermann reaction.

Of great practical importance to otologists are Benario's conclusions regarding the prevention and treatment of these neurorecurrences, based on this extensive statistical inquiry. In substance they are: (1) The dangerous period is the early secondary stage. (2) The cases most prone to neurorecurrence are those with an extragenital primary lesion, particularly the type known as "chancres céphaliques," or (3) "papular syphilides." (4) Significant prodromal symptoms are headache, vertigo, tinnitus aurium, and visual disturbances.

For these reasons Benario advises: (1) A vigorous and sufficient treatment in the early stages. (2) Administration by intravenous injection unless there is a very strong contraindication. (3) A large initial dose followed by a second in three or four weeks. (4) Vigorous treatment by mercury in the interim. (5) Immediate report to the surgeon upon the appearance of any prodromal symptoms.

The appearance of a neurorecurrence calls for a large dose of salvarsan

¹ Benario, Münch. med. Woch., 1911, No. 1.

and vigorous mercurial treatment. The prognosis is good if treatment is pushed before permanent degenerative changes have taken place in the nerves.

Views similar to those of Benario are expressed in two short articles by Meyer and Frey.¹

Desneux and Dujardin, of Brussels, report 350 cases treated by salvarsan in which 6 cases of neurorecurrence occurred.²

In 2 of these cases, the auditory and facial nerves were involved. Their views coincide with those of Benario, inasmuch as they conclude that all these cases resulted from a syphilitic localized meningitis due to too small a dose of salvarsan administered in a defective manner. They recommend intravenous injection of 1.5 to 3 grains of salvarsan in all primary and secondary syphilides.

Quite in contrast with the views held by all the foregoing writers concerning the cause of the neurorecurrences in cases of syphilis treated with the Ehrlich-Hata preparation, is that of Alexander, of Vienna, in a paper read before the Gesellschaft für Aerzte, Vienna, December 6, 1910.³

Reviewing his material for several years, which includes all the cases sent to the ear clinic from the Vienna General Hospital up to 1907, and, in addition since that date, all the cases from the clinic of Prof. Finger, he is inclined to the belief that the neurorecurrences are directly attributable to the toxic effect of the remedy. He states, in conclusion, that, in his opinion, great caution should be used in the exhibition of salvarsan in specific cases in which there has been or is present any acute disease of the auditory nerve. He believes that "an unfavorable influence is also to be feared in cases of acute syphilitic affection of the auditory nerve in old cases of syphilis or latent chronic syphilis." In cases of hereditary syphilis it is also to be recommended, in the presence of acute manifestations of trouble with the auditory nerve, to wait before giving the Ehrlich-Hata injection.

On the other hand, in cases of chronic syphilitic affection of the auditory nerve with slight impairment of hearing and considerable tinnitus, and in cases with vestibular vertigo, he believes that the nervous manifestations cannot be attributed to the remedy. He reports good effects following the remedy in chronic labyrinth disease in chronic syphilis.

After a careful review of the whole matter, one cannot fail to be impressed with the soundness of the views of the previous writers quoted rather than those of Alexander. Personally, I should greatly favor the theory which they advance rather than believe that the

¹ Wien. klin. Woch., 1911, No. 11.

² Münch. med. Woch., June 6, 1911, No. 23.

³ Annals of Otolaryngology, Rhinology, and Laryngology, June, 1911, vol. xx, No. 2. Trans. by G. L. Richards.

recurrences, even in the early stages, were due to a toxic effect of the remedy, and should strongly advise a large dose, by intravenous injection, whenever any manifestation of syphilis occurred in the auditory or facial nerves, with vigorous mercurial treatment in addition. I should also advise a second dose in two or three weeks if rapid improvement did not follow the first injection.

Dr. Arthur Marmun, of Giessen, reviews the literature of the *Wassermann reaction in rhino-oto-laryngology*, in a paper entitled "A Contribution to the Significance of the Wassermann Reaction in Otology,"¹ and concludes, in view of the fact that lues is often found as an unexplained etiological factor in labyrinthine deafness, that the test should be employed as a routine measure in such cases.

Otosclerosis. Every year one comes across a considerable amount of literature on the subject of otosclerosis which adds little or nothing to a problem which is as yet far from a definite solution.

Quite recently enough careful work has been done histologically to greatly clarify the field so far as the anatomical or pathological condition goes. The question of etiology, however, is still very uncertain. Personally, I very strongly lean toward the belief that otosclerosis invariably is an hereditary defect, and that a positive diagnosis of this condition should not be made clinically without a history of a similar defect in at least one of the patient's ancestors. The difficulties in the way of always eliciting such a history are great, owing to the lack of knowledge of patients regarding their ancestors. Even when they know about defects in hearing, either in one or both parents or grandparents, uncles or aunts, they are often unable to say at what age such defects began.

It would be extremely interesting to look carefully into the working of Mendel's laws regarding the offspring of the defectives (otosclerotics) who married normals (perfect hearing); and even more interesting to observe the offspring resulting from the marriage of two normals, each the resultant of the marriage of a normal and a defective. Would one in three of their children have otosclerosis? Who will live to carry out the observation? Or, allowing that he lives, who will maintain an interest in a question involving such accurate observation for so long a period? Or who, with such parents, will condescend to marry, have enough children, and rear them to the third or fourth decade, when the defect will begin to manifest itself?

Observations on animals, where reproduction is rapid; maturity attained in comparatively short periods; breeding and in-breeding under control; all seem to point to certainties regarding inheritance of dominant characteristics. Every now and then one runs into interesting

¹ Monatschrift f. Ohrenheilkunde und Laryngorhinologie, 1910, Band xliv, Heft 12.

families with inherited defects or characteristics, in which the histories are sufficiently clear to point toward the probability that Mendel's laws could be demonstrated in humans if one could control the breeding and live long enough to observe the results. Since this is impractical, we shall be compelled to devote our attention to the careful anatomical investigation, post mortem, of numbers of cases of otosclerosis in whom it has been possible to elicit a definite history, as well as to record repeated clinical observations regarding function.

Dr. Gustave Brühl, of Berlin, has recently published a most interesting paper dealing with the nature of otosclerosis, basing his deductions upon the results of postmortem anatomical investigations of the auditory organs of eight individuals on whom he had made clinical observations of hearing ante mortem.¹

At the outset, Brühl calls attention to the generally accepted belief in recent years that the characteristic otosclerotic deafness is the result of osseous ankylosis of the stapes in the oval window, the middle ear showing no other abnormality. As to the question of etiology, however, there has been a variance of opinion regarding the original seat of the lesion which produced the ankylosis, some contending that it was in the periosteum; others that it was in the bony capsule. Of all the various agencies causing bone disease in general, to which at one time or another the production of otosclerosis has been ascribed, none have fully met the requirements. Indeed there has been, of late, much doubt regarding the classical "fixation of the stapes" itself as being of such great significance in the production of the symptoms of otosclerosis, owing to the fact that similar changes to those around the ankylosed ossicle have been found in other parts of the petrous bones. Not infrequently, also, the changes have been found in other parts of the petrous without any concomitant fixation of the stapes. This has been particularly noticeable in cases of congenital or hereditary atrophy of the nerve elements in the labyrinth. Per contra, when stapes ankylosis has been observed in cases in which other portions of the petrous were normal, atrophic changes in the labyrinth have been frequently observed. The old idea has been that these degenerative changes were secondary to the stapes fixation, and similar to labyrinth degenerations, which are often the sequelæ of many middle-ear diseases.

Brühl calls attention, however, to a different view of the problem, recently advanced by Manasse,² that the nerve atrophy is the primary and important phenomenon, the stapes ankylosis being secondary or accidental. In other words, that otosclerosis is only one variety of degenerative hereditary deafness. "Thus, in spite of all the clinical

¹ Les Archives Internationales de Laryngologie, etc., January and February, 1911, p. 1; Abridged trans., Jour. of Laryngology, June, 1911, vol. xxvi, No. 6.

² Verhandlung der Deutsch. Otolog. Gesellsch., 1909.

and microscopic research of the last twenty years, the picture of otosclerosis is still blurred and indistinct."

Brühl proceeds to outline his personal views of the nature of the disease deduced from his studies of the auditory organs of the eight individuals mentioned. In the normal condition, the bony capsule is composed of an external layer covered with connective tissue, which is contiguous to the mucous membrane of the middle ear; and an internal layer derived originally from cartilage, which extends into the periosteum lining the interior of the labyrinth. This internal layer still possesses islands of unossified cartilage, even in adults. The foot-plate of the stapes is covered with a delicate mucous membrane, the deeper layers of which are merged into the periosteum of the ossicle.

"In otosclerosis, certain areas of the bone undergo a process of porosis or spongification, the tissue of which is characterized, *inter alia*, by a strong affinity for microscopic stains. These disease areas, or foci, are separated by a clear line of demarcation from the hard, eburnated and compact bone around them. The new bone is very vascular. It is rich in cell constituents, and the cells are large and irregularly distributed. In addition to these features, the bone of the diseased areas presents a considerable difference in size and contents of its medullary spaces, and there is also an obvious difference in its age. The clinical effect of the lesions, like those of certain pathological changes in the central nervous system, depends upon their situation and upon their extent."

The preparations were classified into four groups, according to the situation of the hyperostoses:

1. Those in which the changes in the bone occurred near the stapes *without* ankylosis of the ossicle.

2. Those in which the focus was limited to the region of the oval window and stapes *with* ankylosis of the ossicle.

3. Those in which there were many and extensive foci *with* ankylosis of the ossicle.

4. Those in which the foci were far removed from the oval window and *without* ankylosis of the ossicle.

The important points to which Brühl calls attention in his specimens were:

1. The bone in front of the oval window was more seriously affected than that behind it.

2. The hyperostoses always originated in the oldest part of the bone, *i. e.*, superficially, just under the periosteum.

3. In addition to these foci there were, in most of the specimens, other foci far removed from the region of the stapes and promontory.

4. In all specimens there was a visible new formation of bone by osteoblasts and resorption by osteoclasts, particularly in the younger areas of diseased bone.

5. The diseased areas gave the appearance of an enucleable foreign body.¹

6. The changes were confined to that part of the bony capsule which is developed from the endochondrium in only two of the specimens.

It is thus evident that deafness developed both in patients in whom a lesion was demonstrated to have involved the capsule in the region of the oval window with fixation of the stapes, and in those in whom the lesion was far removed from the oval window and there was no fixation of the ossicle.

Brühl believes that no particular etiological importance can be attributed to the atrophy of the labyrinth in the causation of the stapes ankylosis. In support of this, he calls attention to the presence of similar atrophic changes in the labyrinth occurring in suppurative middle-ear conditions, "but no one would dream of ascribing the suppuration to the labyrinthine lesion." Indeed, he is quite correct in saying that "it is impossible to imagine by what means atrophic changes in the labyrinth could provoke such a definite and unmistakable lesion as that of ankylosis of the stapes."

On the other hand, he believes that the cases which showed atrophic changes in the labyrinth, at the same time showing otosclerotic changes in the bony capsule without fixation of the stapes, represent a different type, etiologically speaking. The changes here are due to trophic disturbances. Bone formed from endochondrium is poorly nourished; exhibits a marked tendency to undergo resorption, and is easily affected by trophic disturbances. Even under these circumstances he is at a loss to establish any connection between the scattered lesions in the bone and the atrophy of the labyrinth. It is easy to refer both conditions to the same trophic disturbance, but we must at the same time remember that either may exist without the other. Certainly when deafness is present in these cases it is due to the atrophic condition in the labyrinth, and does not exhibit the characteristics which identify the typical cases in which the stapes is fixed. He argues that if the atrophy of the labyrinth were the initial lesion, the cases with which we come in contact would show nerve deafness instead of middle-ear deafness.

The one constant concomitant to stapes fixation which Brühl found was a fibrous thickening of the mucous membrane of the middle ear in close proximity to the disease focus in the bone. This was, in his opinion, secondary to the process in the bony capsule.

The change in the bone was not inflammatory. Orth examined Brühl's specimens and concluded that the process was a spongy hyperostosis, produced as follows: "The vessels in the periosteum enlarge, and at the same time the bone, which is developed from the periosteum,

¹ Alexander, Arch. f. Ohrenheilk., Band lxxviii.

undergoes resorption, its place being taken by new-formed porous bone." This view coincides with that of Starem, who examined Siebenmann's preparations.¹

Brühl says that the use of the term "periostitis" or "osteitis" for this condition would bring us no nearer a solution of the problem, and suggests the use of the term "*spongy hyperostosis in the oval window*" for the condition in which there is stapes ankylosis, retaining the term of Siebenmann, "*spongy transformation of the petrous bone*," for the cases with development of foci removed from the oval window, without stapes fixation.

Next considering the causes which lead to these peculiar changes in the region of the oval window, he expresses the opinion, which coincides with that of Prof. Gebhardt, of Halle, the well-known authority on transformation of bone, that they are the result of the action of forces of traction and compression.

The following reasons are advanced for the tendency of the bone in the region of the stapes to proliferate: "Immediately in front of the oval window the tendon of the tensor tympani passes over the 'arciform fasciculus' on its way to the malleus; secondly, the movement of the stapes is more extensive in the anterior than in the posterior pole of the oval window. The continual pulling of the tendon, together with the friction of the foot-plate of the stapes on the anterior border of the foramen ovale, produces an incessant movement of the periosteum and an irritation of the bone lying between the tendon and the annular ligament of the stapes. The cartilaginous covering of and the cartilaginous residua in the bone in this place render it very liable to transformation. To sum up, the traction and friction induce hyperemia and a tendency to proliferative processes in the periosteum and the bone."

In the majority of cases the hyperostosis is limited to the oval window, and in all cases this is the oldest lesion; so that it may be assumed that this is the initial lesion which induces the subsequent deposits in the few cases where diffused foci in other parts of the bony capsule take place.

In support of this theory of etiology, Brühl calls attention to the facts:

1. That, in typical cases, the lesion is confined to the oval window; in such cases, the early fixation of the stapes stops the irritating movements and checks further proliferation.

2. Otosclerosis is seldom found in lesions of the middle ear where adhesions have immobilized the tensor tympani or the stapes.

He accounts for the comparatively few cases by the supposition that a peculiar hereditary predisposition, like that which leads to the formation of multiple osteomata elsewhere in the body, must exist. He

¹ Zeitschr. f. Ohrenheilk., vol. xxxiii.

brings his theories to a practical end by suggesting possibilities in the way of treatment. Threatening ankyloses in other parts of the body are met by putting the parts at rest, and he suggests that, where hyperostosis of the oval window is discovered early by obvious discoloration of the membrane, or hyperostoses elsewhere, the disease might be arrested by division of the tensor tympani muscle, or removal of the portion of the malleus to which it is attached. When ankylosis has taken place, with an intact labyrinth, he suggests that a mastoid operation be performed, and a new fenestra be made at the tuberosity of the ampulla of the external semicircular canal, as hyperostosis seldom occurs at this place. While these theories are ingenious and the deductions plausible, it may be well, as he suggests at the close, to wait until many more postmortem investigations can be carried out on persons whose hearing has been carefully tested during life.

Ferreri (Rome) discusses the "Pathology and Situation of Otosclerosis,"¹ agreeing with Moss, Bezold, Scheibe, Politzer, Hartmann, and Siebenmann that the condition is a primary osseous lesion of the stapes, the oval window, and the capsule of the labyrinth. Among the causes, he mentions diabetes, arthritic tendencies, gout, neuropathic and neuroparalytic influences, heredity, ozena, and syphilis. Calling attention to the claims of Scheibe that 37 per cent., and of Bezold, that 52 per cent., are due to hereditary influences, he notes that osteomalacia and rickets, which he claims are much more common than syphilis, are hereditary maladies, and in this point lies a prospect for successful treatment. He advocates the use of Wright's diplococcic vaccine for osteomalacia, and claims to have been successful with it in the treatment of otosclerosis.

In a very detailed and accurate account of a postmortem examination of a case, "A Histologically Examined Case of Otosclerosis," Dr. Otto Mayer,² of Vienna, says that formerly stapes ankylosis was looked upon as the chief characteristic of otosclerosis, and the clinical diagnosis seemed to rest entirely upon this point. Today we are convinced that fixation of the foot-plate of the stapes is only coincident; that the labyrinth atrophy is part of the phenomena and in many cases determines the clinical picture of the disease. In spite of this, it is not as yet clear in what the anatomical changes consist, in either the bone or labyrinth; hence the author reports the histological findings in both organs of hearing in a well-marked case:

History. Male, aged fifty-seven years; gardener; died after one day in the medical division of the Gratz Hospital.

Diagnosis. Acute lymphatic leukemia.

¹ Arch. Internat. de Laryngol., d'Otol., et de Rhinol., July, August, 1910.

² Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie, 1911, Band xlv, Heft 3.

At autopsy, both organs of hearing were secured, knowing that the patient was totally deaf; from other sources it was learned that the patient was hard of hearing for twenty-one years, and during the past few years totally deaf. He often complained of dizziness and tinnitus. His mother, too, was deaf for twenty-three years.

Both temporal bones were removed ten hours after death, and sectioned after opening the antrum by a saw-cut perpendicular to the postpyramidal surface and through the mastoid tip. The sections were placed in a solution of 5 per cent. bichromate of potash, 10 per cent. formol, 1 per cent. glacial acetic acid. After four weeks they were put, for decalcification, into 5 per cent. solution nitric acid, with 10 per cent. formol, and, after removing the acidity in sodium sulphate solution, they were washed for twenty-four hours, then hardened in alcohol and embedded in celloidin. The cutting was always done perpendicular to the posterior surface of the pyramid. Sections were stained by Van Giesen, hematoxyl, eosin, lithion, carmine, Gram, Weigert. Morrow differentiation stain after Walters-Kulschitzky.

He sums up the changes found in the right ear as follows:

1. In the bony labyrinth capsule, foci of typical otosclerosis separated by good bone.

2. In one of the foci there was a cyst.

3. Stapes plate was partly grown to the rim of the window by new bone, causing stapes ankylosis.

4. In the niche of the oval window the periosteum was compact and much thickened, somewhat infiltrated by lymphocytes. The mucous membrane is also thickened by compact connective tissue and infiltrated by lymphocytes. The bone was much thickened, whereby the niche had become narrowed.

5. In the niche of the round window the mucous membrane was very hyperemic and infiltrated with lymphocytes, and the niche was closed by obliquely spread folds partly compact and partly hyperemic and infiltrated.

6. The mucous membrane of the rest of the tympanic cavity was at various points compact with graphocytic infiltration. The mucous membrane layer of the membrana tympani was partly thickened by compact connective tissue. No scars; the membrana propria was intact.

7. At one place along the floor of the tympanic cavity there was a fresh serous exudate containing Gram positive cocci, and in a cell on the floor there was an exudate rich in fat nuclei cells, but no cocci. The rest of the tympanic cavity cells were mostly free from exudate excepting a few that contained a serous exudate.

8. The ductus cochlearis was either narrowed or else entirely obliterated by a sinking of Reissner's membrane.

9. The stria was atrophic, poor in bloodvessels, deeply pigmented, and the loose tissue was substituted by a compact connective tissue.

10. The organ of Corti was highly degenerated; the basal turn was wanting.

11. The ganglion cells of the ganglion spirale had not diminished much in number, but were somewhat shrunken, with increased connective tissue between.

12. The nerve fibers of the Ramus cochlearis in the region of the canal of Rosenthal and the lamina spiralis ossea were diminished. The borders of the marrow were degenerated. The stem of the nerve in the internal auditory canal was not much contracted.

13. The nerve places in the semicircular canals and vestibular apparatus were degenerated.

From these findings Mayer reasons there can be no doubt that this is a case of otosclerosis, since we have a typical picture of the condition by (1) the typical foci of disease of the bone at the pyramid, (2) a stapes ankylosis, and (3) a labyrinth atrophy.

Left ear sections were made in the same way as on the right. The findings were quite similar. From these findings Mayer concludes that the resorption of bone starts from the marrow. From the marrow there is formed, by proliferation of the connective-tissue cells, an embryonic cell tissue which divides the bone partly by lacunar resorption and partly by the ingrowing of sprouts into the Haversian canals. This proliferation taking place in the bone marrow led the whole process. The periosteum, on the other hand, takes no part in this resorption.

In another paper in a subsequent issue of the *Monatsschrift für Ohrenheilkunde*, "The Pathogenesis and Etiology of Otosclerosis," Mayer¹ critically discusses the literature covering many years in a very able manner, and incidentally takes issue with Brühl regarding the etiology of the disease.

He says that since Denker, in 1905, defined otosclerosis as a condition portrayed pathologico-anatomically by a process leading to an ankylosis by bony overgrowth of the stapes in the frame or niche of the oval window, there have been many important histological and clinical observations made which caused doubt to fall upon this statement. Manasse proved there could anatomically be disease of the bone without stapes ankylosis, but with a labyrinth atrophy; therefore, in these cases, the poor hearing and deafness were not related to any stapes ankylosis, but were related to the labyrinth atrophy. This finding caused Manasse to doubt that the bone changes were the cause of the clinical phenomena of otosclerosis, and he expressed the opinion that the atrophic degenerate changes of the nerve of hearing apparatus claimed a far greater importance clinically, because, of 9 cases examined

¹ *Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie*, 1911, Band xlv, Heft 4.

by him histologically, only 4 showed a stapes ankylosis; and all cases, even with the stapes ankylosis, showed a clinical picture of nerve deafness. This, then, entirely changes the conception of otosclerosis, for those who accept this newer view. As a result of his histological examinations, Mayer believes that although disease of the bone and labyrinth atrophy are not directly dependent on one another, nevertheless both affections can be ascribed to one particular causation, viz., disease of the vascular system.

The chief points of his paper are as follows:

1. The appearance of bone disease at definite places of the pyramid and the observed symmetry indicate that the foci arise from the end terminals of the *arteria nutritiæ*.
2. That definite places, markedly circumscribed, hemorrhages, and the formation of cysts indicate that circulatory and, through it, nutritive disturbances in the bone are the cause of the bone changes.
3. Such a bone change takes place in *osteitis deformans (fibrosa, v. Recklinghausen)* and in the *osteo-arthritis deformans (Wollenberg)*; in both cases it is assumed to be due to circulatory disturbances.
4. By clinical observation it is proved the vasomotor disturbances occur in otosclerotic patients.
5. Anatomical and histological findings prove that otosclerotic patients are often arteriosclerotic.
6. Upon clinical observations, diseases of the vessel wall (*arteriosclerosis, endarteritis luetica*) are designated as a causation of otosclerosis.
7. The atrophy of the organ of Corti is a result of the atrophy of the *stria vascularis*. This, however, is caused by circulatory disturbances (*arteriosclerosis, endarteritis luetica*).

While these investigations have led Mayer to the belief that the anatomical changes in the otosclerotic (it is understood to include the entire organ of hearing) are caused by disturbances of circulation, the foremost cause of which is a faulty function of the vasomotors, he asserts that it is also likely that other local circulatory disturbances, as organic disease of the vessels, may cause the same changes. In this way he says we may account for the different forms of otosclerosis which we encounter. Heredity of otosclerosis, in his opinion, depends upon an inheritance of the causative factor of the disease.

In a paper on the otosclerosis question, Dr. Emil Fröschels,¹ of Vienna, calls attention again to a point in diagnosis which he had published two years before. He examined 122 cases of deaf-mutes to substantiate his belief that in otosclerosis there is a diminution of the "tickle sensation" in the external auditory canal. He found the sensation absent in nearly all cases. In comparison, he found only 6 cases in 75 normal

¹ *Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie*, 1910, Band xlv, Heft 11.

hearing children who did not react to the tickling in external auditory canals. Among the 122 cases of deaf mutes, 110 were hyperesthetic.

It was quite remarkable that the tickle sensation was absent in cases of deafness arising from meningeal diseases.

Fröschels says that we must conclude that either the vagus or trigeminus nerve is at fault. From these premises, he argues that the loss of sensation in the external auditory canal in otosclerosis is not due to changes in the mucous membrane in the middle ear. Consequently, inasmuch as the loss of hearing and the loss of tickle sensation occur simultaneously and proportionately, the loss of hearing cannot come from changes in the mucous membrane of the middle ear. He is unable to decide how much the changes in the labyrinthine capsule have to do with the phenomenon, because the nerve connection between the labyrinth and middle ear is not well enough known. However, the progressive diminution of the tickle sensation seems to speak against any motor origin. He suggests that valuable anatomical material may be obtained by examination of deaf dogs and cats for absence of the tickle sensation in the external auditory canals.

Disturbance of Hearing and Insanity. Dr. Schaefer,¹ Lengerich, I. W., reports the case of a non-commissioned officer of artillery in whom deafness and tinnitus followed the detonation of a heavy field gun behind which the patient stood at the firing time. The writer believes the concussion shock to the membrana tympani and inner ear to be the etiological factor for the insanity which developed nine months after the accident. The patient remembers that at the time of explosion he was swallowing saliva, was prostrated on the ground, and at once had deafness and tinnitus aurium. Schaefer concludes that, even if there was no cerebral concussion at the time, we must assume that the injury he suffered would, in results, follow the same laws: The concussion struck at first the membrana tympani, and this concussion was increased at the moment because the patient was swallowing saliva, thereby closing off his tympanic cavity from the pharynx, and so could not transmit the pressure of the sound waves from the membrana tympani through the tympanic cavity to the air in the pharynx. The force of the sound waves would not have been less, even if the membrana tympani had both ruptured, because it had to travel undiminished by way of the ossicles through the vestibule of the cochlea and the semicircular canals to the delicate end-organs of the acoustic nerve. He was uncertain as to what happened. Possibly there had been a pulling apart or a tearing of the vessels or the finest nerve fibers. He was also uncertain in just what way the effect of the concussion had been transmitted to the distribution of the auditory nerve in the brain cortex. He could only say that a strong movement and pulling of the nervous tissues

¹ Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie, 1910, Band xliv, Heft 10.

that take up and transmit the sound to the cerebral cortex must have occurred.

Afterward there had been partial loss of consciousness for a short period, with head dulness, and the auditory symptoms had followed. For his insanity, no other cause could be discovered.

The Hearing Function in Old Individuals. Dr. Umberto Luigi Torrini,¹ of Florence, Italy, carefully examined and tabulated the hearing function in 200 old people over fifty years of age. Among these were also those who had no ear lesions. The tests made use of were the fork series, whisper, bone conduction, Rin  , air conduction, upper and lower tone limit, and Weber. It was found that, in almost all cases over fifty years, there was some diminution of air conduction. Most of the cases also had an O. M. C. C., even if slight, and this accounted for the large number that showed some diminution in bone conduction. Arteriosclerosis was responsible, in many of the tabulated cases, for a diminution of the labyrinth function, and their number increased as age advanced. The same was true of the cases of diminished bone conduction.

Torrini summarized as follows:

1. The functional strength of the organ of hearing decreases as age over fifty advances.

2. The changes occur in both middle and internal ear, so that the perception time for both bone and air conduction appears shortened.

3. The hearing for whisper is most affected, since it needs the better functioning of the conducting apparatus.

4. On account of the disturbance of function of both the middle and inner ear, we generally find a change in the perception wave of both high and low tones.

5. With increasing age after fifty years, there is a gradual diminution of function in the entire organ of hearing, manifesting itself largely in the perception for speech.

6. When a scar is visible in the membrana tympani, the hearing defects will be well marked, especially those of the middle ear. Impairment will be most evident for the whisper and the lower tones; this increases with age.

7. In purulent inflammatory conditions, which have affected the inner ear by toxic and degenerative changes, the organs of Corti give evidence of marked deterioration.

8. A purulent inflammatory condition of the middle ear, on account of the seat of its development, causes a marked diminution of function of the conducting apparatus, especially in the perception of the lower tones and whisper, often amounting to complete loss.

¹ *Monatsschrift f  r Ohrenheilkunde und Laryngo-Rhinologie*, 1911, Band xlv, Heft 2.

9. A dry perforation, owing to the former long-continued purulent process, causes the same defect as the purulent middle-ear inflammation; often more pronounced, especially for speech.

The Inter-relationship of the Vestibular Apparatus and the Cerebellum. Bárány,¹ to whom we owe so much for his brilliant work in elaborating his coördination tests, read a most interesting and important paper on the subject before the Swedish Otological Society, in Stockholm, February 27, 1911.

He said that at the time of the publication of his book on the *Physiology and Pathology of the Semicircular Canals*, in 1907, he had no idea of their close relation with the cerebellum. In a general way he had been aware that the cerebellum was known as the centre of equilibration and orientation, but so vaguely that he had purposely avoided any mention of the matter in his book. He had, at that time, been quite contented with the explanation that the reflex vestibular phenomena took place through the well-recognized communications apart from the cerebellum—from the vestibular ganglion to Deiters' nucleus; thence through the posterior bundle, with the axons of the cells in the oculomotor and abducens nuclei, bringing about nystagmus; from Deiters' nucleus through the vestibulospinal path, bringing about the disturbances of equilibration which accompanied the induced nystagmus. He had thus totally ignored the cerebellum in his consideration of the phenomena. After studying the results of Marburg and Benz in producing ataxia in dogs by artificial destruction of the cerebellar tracts, he was led more deeply into the whole question.

This train of thought had come to him: A normal person, in whom a left directed nystagmus has been induced, looking straight ahead, tends to fall to the right; with head rotated 90 degrees to the left, he tends to fall forward; with head rotated 90 degrees to the right, he tends to fall backward. How can this totally different stimulus to the skeletal muscles be explained? He eliminated the possible explanation that the additional movement of the head had caused the phenomenon by noting that the same result obtained when the head was placed in those positions before the nystagmus was induced. Thus, he was forced to the conclusion that these alterations of equilibration were due to the sensibility of the muscles and joints of the neck and head, the proprioceptive system of Sherrington. The movement of the head, together with the vestibular stimulus, must produce this effect on the skeletal muscles. In what area of the brain did this association occur? Was this the function of the cerebellum? He had observed, as had others, that there was an ataxia and a spontaneous nystagmus both in patients with cerebellar disease and vestibular affection, with the difference that in those with cerebellar disease neither the direction of the

¹ Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie, 1911, Band xlv, Heft 5; abs. trans., Journal of Laryngology, Rhinology, and Otology, August, 1911.

nystagmus nor the position of the head bore any relation toward the direction of the tendency to fall.

He then began investigations of caloric vestibular reactions in cerebellar cases. A patient with cerebellar ataxia, who had a tendency to fall to the right and backward, was found, upon test, to exhibit the usual vestibular reactions, on both right and left, on cold irrigation. When an attempt was made to influence the falling by turning of the head in the usual manner, it was discovered that the usual result occurred when the left side was stimulated, but that there was absolutely no result when the right was tried in a similar manner. He had, therefore, diagnosed a tumor of the right cerebellar hemisphere. This was subsequently proved at autopsy.

Subsequently, on another case exhibiting similar phenomena, he had been chagrined by making a diagnosis of the wrong side.

After careful reading of the writings of Cajal, Balk, Nothnagel, Piroeles, and Mann, upon the histological anatomy of the cerebellum and its connections, he was led to try Grafe's pointing test on cases in which there had been an induced physiological nystagmus. He found that there was always a deviation in pointing away from the direction of the induced nystagmus. He now reasoned that if, in disease of the middle lobe, there was no tendency to fall, in diseases of the lateral lobes the normal deviation in the pointing test should be absent; on the other hand, if diseases of the middle lobe caused spontaneous falling, diseases of the lateral lobes should cause spontaneous deviation in the pointing test. Having established the correctness of this supposition in two cases, he demonstrated them at the meetings in Vienna, and communicated his observations to several medical societies and to the meeting of the British Medical Association.

At this latter meeting Sir Victor Horsley had brought forward 4 cases operated upon for cerebellar lesions and completely healed. In 3 of these cases Bárány readily diagnosed some lesion of the left lateral lobe from the fact that no reaction movements (pointing) occurred on the left side when a right directed nystagmus was induced, while very decided deviation in pointing occurred with both arms when an opposite nystagmus was induced from the other side.

In the fourth patient the pointing tests were quite normal, but after left induced nystagmus, by cold irrigation of the right ear, there was no tendency to fall on turning the head to the left or right, while on right induced nystagmus, by cold irrigation of the left ear, the falling test was very manifest. He thus declared that there had been a lesion of the right side of the middle lobe of the cerebellum. Sir Victor Horsley later stated that this had actually been the seat of a glioma which he had removed. A case of cerebellar abscess operated by Mr. West also served to confirm the correctness of these observations.

In the fall of 1910 he made further investigations, all of which

tended to confirm his observations. One case showed plainly that it was not always possible to demonstrate previous lesions, and led to the belief that other areas took up the function and compensated for the loss in the involved area. Further research had also shown that isolated reaction movements of individual joints might occur, as could be demonstrated by fixing or resting the upper or forearms, etc. He had also definitely located one cerebellar tumor before operation by the same method.

Localization in the Cerebellar Cortex. Bárány made a preliminary communication on this subject in a short paper entitled "Temporary Depression of the Function of the Cerebellar Cortex after the Method of Trendelenburg, Evidenced by the Pointing Test; Localization in the Cerebellar Cortex."¹

At the Physiological Congress in Vienna, 1910, Trendelenburg demonstrated his method of non-injurious inhibition of the cerebral cortex by lowering the temperature. He used cold normal salt solution up to -7° C. ($+19.4^{\circ}$ F.). This reduced the temperature at the dura only to $+12^{\circ}$ C., owing to the fact that Trendelenburg allowed the fluid to flow through a rubber bag applied to the part of the dura to be cooled. Bárány determined that since the lowering of the temperature of the dura was only $+12^{\circ}$ C. ($+53.6^{\circ}$ F.), he might with safety try the experiment on the human patient. He chose patients with exposed cerebellar tissue from abscess or sinus or labyrinth operations. He demonstrated that in patients who had had a labyrinth operation, he could predict in which direction the pointing would be, provided that any reaction took place from the lower temperature. A patient with healed right-sided cerebellar abscess had, at the time of the acute disease, pointed outward with the right arm. Later, he had pointed to the left with the right arm. The other patients, who were quite or totally deaf, and who had other symptoms indicative of cerebellar disease, all had, when the pointing reaction was disturbed, pointed spontaneously outward; whereas, after vestibular stimulation, by turning or irrigation of the canal, the pointing reaction to the left had been absent. From this Bárány concluded that the position of the centre for controlling the movement toward the inner side must be on the surface of the cerebellum behind the labyrinth. Therefore he reasoned that if he succeeded in paralyzing this centre by cold, the pointing must be outward. Many tests, in two patients who had labyrinth operations, showed, after irrigation of the external auditory canal of the operated side, a pointing of both the arm and leg of the operated side outward, whereas the other side was uninfluenced. He complicated the test by irrigating the healthy ear with cold water, getting a nystagmus to the operated side and a pointing or movement of both the

¹ Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie, 1911, Band xlv, Heft 3.

upper extremities to the healthy side. When the operated ear was irrigated with cold water, the arm of the sound side pointed to the healthy side (inward) the arm of the operated side pointed outward. While these experiments seem to prove the author's theory, still he is in doubt, as the pointing movements do not occur with the mechanical promptness of the labyrinth reactions, and the area of deviation is slight. Later, in a patient in whom the cerebellum closely behind the pinna was covered by dura and skin only, he had caused (by cooling with ethyl chloride) an absolute pointing movement outward in the arm and foot of that side, whereas the arm and foot of the other side pointed normally, and there was no trace of nystagmus. Further exact tests must prove the value of these reactions. Bárány tried to show movement in other directions by cooling other parts of the cerebellum in two patients whose dura over the posterior cerebral fossa had been exposed after sinus operations, but covered over by skin. He used water at 10° C. (50° F.), but got no decided results, although the arm and leg of the operated side would often move inward (the opposite to the result on the labyrinth operated cases). The reactions were weak, and he thinks that the intact skin and thickened connective tissue prevented the cold from penetrating. He declares that these tests of the pointing movement of the extremities, after partially cooling different areas of the cerebellar cortex, may eventually locate the seat of the centres for different movements. Bárány promises to make further studies which we shall look for expectantly as possibly throwing further light on a subject of deep interest to all who have to do with diseases involving the labyrinth or cerebellum.

The Labyrinth. LABYRINTHITIS. The literature of the year has shown remarkable interest throughout the world in diseases affecting the labyrinth. Most of the writing has been a record of interesting clinical cases with occasional deductions from the experience. One striking fact stands out prominently from all this array of clinical material, viz., that as experience grows, the majority of aural surgeons are inclined to let cases of *acute purulent labyrinthitis severely alone* until they have passed into the latent stage, unless very evident symptoms of intracranial involvement manifest themselves. In addition to this, one notes a feeling of reserve in many regarding operative measures, even in the latent cases. The whole matter is still *sub judice*, but it is interesting evidence of rapid progress to note that matters of diagnosis, prognosis, and operative technique, which were wholly unknown, except to a few, only a short time since, are now common property of the majority. Perhaps no paper of the year has shown as much careful study of clinical material as that of Dr. Max Görke, of Breslau, who wrote on "The Pathology of Inflammatory Diseases of the Labyrinth."¹

¹ Archiv für Ohrenheilkunde, Band lxxx, Heft 1 and 2; abstract, The Journal of Laryngology, Rhinology, and Otology, August, 1911, vol. xxvi, No. 8.

He says that *infective labyrinthitis* is practically always the result of a meningitis or otitis media. The few reported cases of primary labyrinthitis he believes to be more apparent than real, probably the result of abortive forms of meningitis, the infection passing through the aquæductus cochleæ from the subarachnoid spaces to the perilymphatic system of the labyrinth. Brueger has even gone so far as to attribute the deafness following mumps to a transitory attack of cerebrospinal meningitis.

Causes. By far the greatest number of cases result from middle-ear suppuration. The labyrinth is seldom invaded from the cranial side, except by epidemic cerebrospinal meningitis.

In his experience, chronic otitis media is responsible for many more cases than acute otitis. Tuberculosis is the most common cause; cholesteatoma the second in order; both causing a septic infection of the labyrinth.

In the other forms of chronic suppurative otitis, infection of the labyrinth usually occurs during an acute exacerbation. This is not infrequently set up by traumatism, like the removal of polypi, curettage, etc.

Of the acute forms of suppurative otitis causing labyrinthitis, the scarlatinal type is most active.

Routes of Infection. Owing to the more direct continuity of the meninges with the labyrinth, a meningitis is more prone to set up a labyrinthitis than is suppurative otitis. The percentages are, according to Görke's statistics, for 50 cases, 30 per cent. in meningitis; 2 per cent. in suppurative otitis.

In the meningeal variety, which, as a rule, occurs in epidemic cerebrospinal meningitis, the infection takes place through the internal auditory meatus or through the aquæductus cochleæ. In the latter case the infection involves the basal whorl of the cochlea, leaving the vestibule intact in the early stages. When the infection has followed the internal auditory meatus, both portions of the labyrinth are usually involved. In the early stages, therefore, a functional test may serve to indicate the route of infection. When infection enters the labyrinth from the middle ear, it has to pass more difficult anatomical barriers. The favorite sites are the round window, the oval window, and the external semicircular canal. The round window, in Görke's experience, was penetrated more frequently than had been supposed, owing, in his opinion, to the fact that pus easily stagnates there, and granulations are prone to form in its niche. He did not find erosions of the external canal as often as others had reported, and he called attention to Kummel's opinion that such erosions, though frequent, did not often cause infection of the labyrinth.

Referring to the difference of opinion regarding the preferred route of infection in acute and chronic suppurations, some contending that

the fenestræ were preferred in one, some in another, Görke says: "In tuberculous middle-ear disease there is no regularity. In simple suppuration of the antrotympanic cavity the posterior parts of the middle ear, together with the wall of the aditus, prove the most vulnerable because of the tendency of pus to collect in this neighborhood. Cholesteatoma readily leads to erosion of the external semicircular canal, because of the confined space in the aditus. Other sites of invasion are rare. The most usual place is in the region of the fenestræ, and it is here that the breach should be sought for in acute labyrinthitis."

Görke believes, also, that infection of the labyrinth may take place through the circulation, despite the fact that it has been doubted by some if there was any connection between the bloodvessels of the middle ear and labyrinth.

He mentions another method which has been variously described as *collateral or induced labyrinthitis*, *labyrinth irritation*, or *labyrinthitis serosa*, or *serofibrinosa diffusa*. His description is similar to that of Nager. "It seems to be essentially a collateral edema of the labyrinth spaces characterized by an increase in the bulk of the labyrinth fluid contents, and by the presence of albuminous coagula, and leading to characteristic changes in the situation of the membranous saccules and walls. Induced labyrinthitis may exist without any obvious breach in the outer wall of the labyrinth, but, in some of the reported cases, the changes in the wall, usually in the region of the fenestræ, were so considerable that a breach must have been imminent. These changes consisted in infiltration, thickening, and partial disintegration of the membranes of the fenestræ, and they were accompanied by collections of pus cells on the inner aspect of the fenestræ. Inflammatory reaction within the labyrinth, similar to that due to middle-ear disease, is seen in meningeal labyrinthitis when the infection has entered the perilymphatic spaces, but has not yet penetrated the endolymphatic spaces. At this stage the latter show albuminous coagula, fibrinous deposits, desquamation of epithelium, and displacements from increase in the fluids of the labyrinth, just as in the serous labyrinthitis collateral to middle-ear suppuration."

It is not unusual to find several breaches in the labyrinth wall. These occur most frequently in tuberculous, cholesteatomatous and scarlatinal otitis media. These breaches may have been made from without inward or *vice versa*. According to Görke, these portals of exit and entry may be distinguished from one another.

Histological Changes at the Breach. At the oval and round windows edema and cell infiltration occur. The annular ligament at the oval window is studded with clumps of pus. Displacement of the stapes in either direction may take place.

The resistance of the endosteum is remarkable; so much so that pus

may often be seen separating the membranous labyrinth from the bone without having penetrated it. Granulation tissue springs up on the surface of the membrane as soon as the inflammation reaches it. These changes are most marked in the meningeal cases in which the infection has taken place through the aquæductus cochleæ. The internal aperture of the aqueduct is soon closed up by budding granulations which have a great tendency to become transformed into connective tissue, which later undergoes ossification. These processes may eventually completely close the aqueduct.

Extension of the Disease within the Labyrinth. With the exception of the very sluggish cases (tuberculosis) and the fulminating cases following trauma, the protecting influence of the granulations always occurs.

In the former cases there is no local reaction, and the whole labyrinth is rapidly filled with pus.

Görke asserts that a general purulent labyrinthitis is very rare except in traumatic cases, and that *these intralabyrinthine defences usually succeed in limiting the disease, so well in some instances that the shut-off spaces show no abnormality whatever.* In most instances, however, a "collateral" labyrinthitis occurs.

He takes issue with Ruttin, who attributed this defensive process to the action of gravity confining the products of inflammation to the lowermost parts of the labyrinth, on the ground that these inflammatory products are not simply liquid pus which is freely movable. It seems much more probable to him that the fine labyrinth canals are filled with granulation tissue which is rapidly transformed into connective tissue.

The limitation of the inflammatory focus within the labyrinth is *imperfect only in slow-going cases like tuberculosis, or in advancing destructive cases like cholesteatoma, or in rapid fulminating processes where the walls are broken down in several places at once.*

Changes in the Shape of the Membranous Canals of the Labyrinth. The labyrinth spaces may be altered in shape by (1) increase in the fluid contents, or (2) by mechanical pressure from pus or fibroplastic exudate. Increase of fluid from edema may occur in the endolymphatic space or in the perilymphatic space, in either case distending the one at the expense of the other. Görke is unable to explain this with certainty, but offers the supposition that the closure of the aquæductus cochleæ may be responsible for it. The explanation that excessive secretion of the stria vascularis is the cause, he claims cannot be proved. In one case which he reports, the infection had entered the internal auditory meatus involving the whole labyrinth. In this case there had been a displacement of both the scala cochleæ and the vestibular saccules. In two other cases the infection had entered through the aquæductus cochleæ. Here there had been a collapse of Reissner's

membrane, with almost complete obliteration of the scala cochleæ, contraction of the saccules of the vestibule, and great bulging of the round window into the tympanum. The first case exhibited a great increase in pressure in the endolymphatic system; while the two last showed a rise in perilymphatic pressure.

Changes in the Bone. The bone changes which occur are either (1) *proliferation* or (2) *destruction*. The *proliferation* of bone occurs in all cases except the very sluggish and the fulminating cases. The changes vary from earliest beginning of ossification to complete filling of the spaces with bone.

The proliferation of bone, according to Görke, is definite for different portions of the labyrinth. In the cochlea, the basal whorl shows the greatest number of spicules. The semicircular canals are often completely filled with bone. Bone proliferation is slight in the vestibule, yet it is often filled with fibrous tissue.

Bone destruction takes place either by necrosis or rarefying osteitis. In order that this may occur, there must be an obstruction to one or all of the arteries supplying the labyrinth; consequently there must be a very intense inflammation. Görke calls attention to the report of Lange, that in 50 per cent. of his cases a subarachnoid abscess had formed at the fundus of the internal auditory meatus where the fibers of the cochlear branch spread out. The abscess forming in this funnel-shaped space had caused a destruction of the bloodvessels and nerves within its area, and, as a consequence, a necrosis of the labyrinth.

Görke says that Lange is correct in saying that the cause for necrosis and sequestration of the labyrinth must be sought for first and foremost inside the labyrinth itself; but that the other vessels must become occluded before necrosis of the whole labyrinth can take place. This may take place as a result of a rarefying osteitis from a severe middle-ear suppuration, the disease extending from the middle-ear cells to the spongy bone surrounding the labyrinth. The rarefying osteitis also attacks the outer layer of the capsule, and in this way the capsule is isolated and dies.

This process may originate from a middle-ear or a labyrinth suppuration.

As Görke says: "There are thus two factors necessary for the production of extensive necrosis of the labyrinth—(1) suppuration of the labyrinth in the severest form, destroying the soft tissues; and (2) widespread rarefying osteitis, set up, like labyrinthitis, by the suppuration of the middle ear and affecting the spongy bone of the petrous to begin with, and finally attacking the capsule of the labyrinth itself."

Effects of Labyrinth Inflammations. Görke suggests three possible terminations:

1. The first, a *restitutio ad integrum*, is almost inconceivable except in the very mildest forms of the so-called serous labyrinthitis.

2. The *inflammatory tissue* may be transformed into *fibrous tissue and bone*. He says (the strongest statement of the paper): "*Even the severer varieties of infection of the labyrinth, with the formation of pus in its spaces, may undergo natural cure in this way. Indeed, it cannot be too often repeated that not even in the severest forms of labyrinthitis are these healing processes absent; and, what is still more important, that in the majority of cases their protective action is effective.*" He says that we shall better understand the natural cure of these cases when we have fully learned the causes leading to

3. The third possible ending, *viz., meningitis*.

Meningitis. ROUTES OF INFECTION. The most usual route is that pointed out by Politzer: An abscess is formed at the fundus of the internal auditory meatus. An inflammatory zone forms around this, which acts as a barrier to the meninges. Once broken down, the meninges are defenceless. In a similar manner, the aqueducts from the cochlea or vestibule may be the portal of entrance to the endocranium.

The routes just mentioned are well known, but Görke points out others with which most clinicians are less familiar. In the necrosis of, or in, the hyperacute inflammation of the soft parts of the labyrinth, a frequent sequel is osteitis of the capsule. Infection of the meninges from any portion of the petrous may occur in this condition. The most usual position is at the vertical semicircular canal, causing an epidural abscess, and later a meningitis.

Görke criticises the frequent reports of cases of meningitis from labyrinthine suppuration on too inadequate information, and insists that certain essentials proving a connection between the events should always be recorded if we are to accept the reports. "Anatomical proof must be forthcoming to show, first, that the labyrinth disease has been set up by tympanic and not by meningeal inflammation; secondly, that the intracranial complication is not the direct result of the middle-ear disease; while, thirdly, the route from the labyrinth to the meninges must be clearly demonstrable."

The Question of Labyrinth Operation. Görke takes a very critical attitude regarding the value of operations in purulent labyrinthitis, contending that we are not in position to state exactly what the value of operating is, inasmuch as we do not know with any certainty what is the value of letting them run their own course. He says that many cases of spontaneous labyrinthitis, both the mild circumscribed and the severe generalized forms, get well of their own accord. He also avers that the very operation which is undertaken for the relief of many cases actually starts up the meningitis we are trying to avert, by breaking down barriers which have been erected.

With this latter point I am strongly in accord. For several years I have insisted that when such operations are attempted they should be done without the use of the mallet and chisel, the concussion from

which may often be sufficient to break down the slight adhesions between the inflammatory focus and the meninges.

Quite in opposition to the majority of writers on the subject, Görke claims that even when the labyrinth is accidentally wounded during the mastoid operation the effect may be so slight as to be negligible, particularly when the breach is a small one in the wall of one of the semicircular canals. He urges that the contention that operation removes all the disease and provides drainage is, according to his investigation, quite incorrect. Having carefully examined cases that had been operated upon, he affirms that, even with all possible care in clearing out the cavities, small (microscopic) particles of bone and debris are left which prevent the very drainage it was the purpose of the operation to secure at the aqueducts and internal meatus.

He therefore strongly urges that *Neumann's ablation operation* is the only safe procedure when one does operate.

He closes his interesting paper with the terse remark that although in recent times labyrinth operations are less frequent than they used to be, he has not seen a single case of late in which he could say that the omission of the operation had led to the occurrence of meningitis.

Labyrinthine Vertigo (Ménière's Symptoms, Non-infective) Treated by Operation. This important case was reported by Dr. G. J. Jenkins, at the May, 1911, meeting of the Otological Section of the Royal Society of Medicine, London. The patient, a single woman, aged twenty-three years, complained of vertigo, tinnitus, and deafness in the left ear. The "steam-escaping" noises had been present for four years. At first they were not very troublesome, but had gradually increased, and finally led her to consult an aural surgeon. An attack of influenza two and one-half years ago had greatly aggravated the noise, and, with only slight remissions at times, they had been a continuous source of trouble to her. About a year before consulting Dr. Jenkins she had had a very severe attack of vertigo, accompanied by nausea and vomiting, lasting about an hour. Once or twice a month since the first outbreak there had been similar attacks, always accompanied by nausea and vomiting, and increase in the tinnitus. Between the attacks, the patient had been able to walk about without assistance, but had been unfit for work. There was no history of earache or aural discharge. She often had left occipital and left upper parietal headaches.

Upon examination (February 17, 1911), Dr. Jenkins had found the tympanic membrane pale on both sides; no cicatrices. Hearing, C² with the fork; Weber, to right; Rinne, positive in both. Bone conduction (Schwabach) right, normal; left, much diminished. Conversational voice: Right, 18 feet plus; left, 3 to 4 feet. Whisper: Right, 18 feet plus; left, about 1 foot. Inflation did not improve hearing on the left side. Eustachian tube patent. Rombergism: Fell to left and

backward; could not walk along a straight line; falling usually to the left; vertigo readily produced by quick movements of the head. No spontaneous nystagmus. Caloric tests: Cold water did not produce nystagmus on either side. Vertigo was well marked and prompt in appearance in the right; but in the left was delayed and less marked.

The physical examination was negative.

Rest in bed and hydrobromic acid gave only slight temporary relief. On March 3, the patient had a severe attack of vertigo and fell to the left. No vomiting. Tinnitus much worse. Functional test showed considerable diminution in hearing on left. Whisper, 2 to 3 inches. There appeared to be an increased labyrinthine pressure, and operation was decided upon.

The left mastoid was opened and the horizontal semicircular canal exposed and opened over a distance of 1.5 mm., the object being to open the perilymphatic space only. At the time of opening, the anesthesia was light and the patient showed evidence of shock. A gauze wick was inserted.

Three hours after the operation there was severe vertigo, vomiting, and spontaneous nystagmus. With the face upward, the nystagmus was rotary left to right, and rotary and oblique upward, and to the right. The patient was restless and nauseated. On the following day she had severe vertigo upon the slightest movement of the head. Two days later the patient was comfortable and resting. There was an occasional slight feeling of nausea. There was vertigo upon movement. The conversational voice was heard at 6 feet on the left. The noises had entirely ceased. Six days after operation she showed spontaneous nystagmus. There was no tinnitus. The conversational voice was heard on the left at 15 feet, single words at 12 feet. Upon sitting up there was a tendency to fall to the right.

There was slight return of tinnitus on the sixth day. Four weeks after operation the conversational voice was heard on the left at 15 feet; a whisper on the left, at 3 feet. High tones of Galton were well heard. Low tone limit below C. Rombergism: Stands steadily with eyes shut; can walk a straight line better than before the operation. Vertigo was readily produced by movement of the head in the plane of the left posterior semicircular canal. Nystagmus: Very fine indefinable movement upon looking to the right. Rotation tests: Vertical position, no nystagmus produced by rotation in either direction; left to right rotation produces vertigo with tendency to fall to right; right to left rotation produces less vertigo, with tendency to fall backward. There is a mild tinnitus which does not annoy the patient.

This is the only case which had been recorded as having been operated upon for the relief of Ménière's symptoms, and is important, as there was such a material improvement in the vertigo, tinnitus, and hearing. In the subsequent discussion, Dr. Jenkins said that Bárány tests had

been applied and there was no evidence of cerebellar vertigo. He also felt certain, from the fact that there was vertigo after cold irrigation on that side, that the left labyrinth was still functioning.

Functional Test for Complete Deafness. Since Bárány described his *noise apparatus*, with which it is possible to temporarily ablate all hearing in one ear while the other is being tested, all who have been called upon to make tests of function where there was doubt regarding the complete loss of hearing on one side have felt that it was indispensable. There can be no doubt that there has been no one device which approaches it in value as a diagnostic help.

About a year ago Dr. Richard Kayser, of Breslau, described a simple method which, in the absence of a noise apparatus, may prove of great service in time of need.¹

It consists in laying the flat hand over the pinna and rubbing vigorously. The noise created in the ear is sufficient to exclude very loud sound outside of it.

The noise may be increased still more by placing a piece of stiff paper over the ear and rubbing it in a similar manner. On several occasions, not having my Bárány's apparatus with me, I have had occasion to prove that this was a very simple and practical method of eliminating the good ear from a test of a very defective one when very loud sounds (shouting, whistling, etc.) were necessary in completing the test.

At the November, 1911, meeting of the Otological Section of the Academy of Medicine, Dr. Francis W. White presented a very ingenious little tube (cut-off) which modified a current of air forced through it (from a double bulb to be carried in one's bag; from the air tank used for spraying in one's office) in such a way as to produce noise enough to completely cut out hearing for outside sounds. The noise was carried to the ears by an ordinary binaural stethoscope. The advantages claimed for it were that it was cheap, easily carried about, did not get out of order, was perfectly efficient, and had not the disadvantage of possibly dimming the hearing of the tested ear by sound conveyed by bone conduction. One very practical feature of the apparatus was the possibility of a control test with it. With both ear tubes of the binaural stethoscope in position, the noise was increased by regulation of the cut-off until hearing in both ears was entirely ablated. Then by removal alternately from one ear and then the other, while the same volume of noise was kept up, one was certain that any hearing demonstrated must come from the free ear. This was a distinct advantage in testing malingerers.

Dr. White worked out the details of this very ingenious noise apparatus in my own clinic, with which he is connected, and I have had occasion to test its real usefulness and efficiency. Its value far exceeds its simplicity.

¹ Monatschrift für Ohrenheilkunde und Laryngo-Rhinologie, Year xlv, No. 11.

Seasickness. The intimate association of the labyrinth with the phenomena of seasickness which has taken place since the vestibular reactions have been so well known, receives an added interest when the men, whose names have been so closely linked with the recent rapid advances in our knowledge of the labyrinth, report the study of their own personal experiences. At the May, 1910, meeting of the Austrian Otological Society, Bárány¹ introduced the subject by calling attention to some personal experiences he had observed while travelling on a "scenic railway" and in rapidly moving elevators. He had noticed that the unpleasant feeling in his stomach which he experienced in descending while holding his head vertically, entirely disappeared if he bowed his head forward to an angle of 90 degrees. From this he had concluded that the unpleasant phenomena of seasickness were at least in part due to the stimulation of the utricle and saccule. Inasmuch as lumbar puncture often relieved giddiness, he suggested that it might be justifiable in some instances to attempt the relief of severe attacks of seasickness by this procedure.

Frey, continuing the discussion, suggested that the relief afforded by bowing the head forward while descending might be due to the fact that this act turned the horizontal semicircular canals into a vertical position, and that the stimulus of the descent thus produced the same sensation one received in moving rapidly forward. This being a sensation to which we were accustomed, did not cause the discomfort.

Neumann was not prepared to admit that the sensations the previous speakers had described were analogous to those of seasickness. He had recently, while crossing, had ample opportunity to study the phenomena both on himself and his fellow passengers. He was unable to discover any nystagmus in any of them, and only noted the psychic conditions of oppression, slow pulse, nausea, vomiting, cold sweats—all due to some stimulation of the vagus.

Vertigo and faulty equilibration were undoubtedly vestibular in origin, but they were not as marked as the previous group of symptoms. Owing to the relief all seemed to obtain by the horizontal position, he had suspected cerebral anemia as being partly responsible, and had attempted to relieve it by the use of a rubber band constricting his neck. This had been of no use, however. By the use of galvanism he had attempted to overcome the vestibular symptoms; trying the current first in one direction, then another, the poles being placed on his tragus and umbilicus. No appreciable change was effected. While he could draw no definite conclusions, he felt certain that the phenomena were the result of a combination of vestibular and vagus impulses, and that little help could be expected from the simple procedure of bowing forward.

¹ Journal of Laryngology, Rhinology, and Otology, March, 1911.

Ruttin had carried out the same experiments as Neumann, and agreed with his conclusions.

Bárány, replying, said that, after the seasickness had appeared, it was impossible to counteract its effect by position of the head, but felt that it would prove a useful prophylactic measure. He could not agree with Frey's solution of the cause of relief, since he did not think any sensation of motion could be communicated to the semicircular canals except by rotation. The straight movements in space were registered by the utricle and saccule. He had previously demonstrated that with the head bowed forward 90 degrees, movement upward would give the impression of forward movement, movement downward would give the impression of backward movement.

Politzer believed that the observation that there was no nystagmus in seasickness was most important, and agreed with Neumann's view that the vestibular portion of the phenomena played a very small part.

In a paper discussing "The Question of Seasickness," Dr. R. Spira,¹ of Krakau, claims seasickness is due to a lack of habit for certain movements, and can be overcome by practising and accustoming one's self to these movements. He attributes the phenomena to a sensitiveness of the vestibular apparatus. People are subject to seasickness who cannot stand round dances, and are sickened, nauseated, made dizzy, etc., by scupping. By repeated dancing and scupping this can be overcome. He recommends the practice of the following exercises a few weeks previous to a voyage: Movements in all directions from above down, from right to left, from before backward and reversed, turning right and turning left. This should be done once or twice daily, increasing the duration and times of practice.

The Organ of Hearing and Multiple Sclerosis. Dr. Oscar Beck,² of Vienna, in an intensely interesting report of two cases, brought out a number of points of great value in differential diagnosis between labyrinthine and cerebellar conditions. While the conditions of the organs of hearing in multiple sclerosis had been practically unknown, it had long seemed probable to Beck that, in this disease, changes analogous to those found in the optic nerve also occurred in the auditory nerve. With this idea in mind, he had repeatedly examined such cases, with negative result. Lately, however, two such cases had come under his observation in which he had had an opportunity to make careful and extensive examinations. It had seemed more than a coincidence that the aural conditions in both cases had been similar, yet he could not say positively that it was pathognomonic. However, it was probable that, in many cases this ear condition might aid in an early diagnosis.

CASE I.—Examination. Male, aged thirty-one years, healthy until three months ago, when attacks of dizziness appeared, especially after

¹ Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie, Band xlv, Heft 3.

² Ibid., vol. xlv., No. 10.

mental exertion. The position of head did not influence the attacks. No tinnitus; no vomiting. During the attacks hearing was poorer in the left ear. The membrana tympani on both sides were normal. There was spontaneous mild nystagmus, rotatory and horizontal to the right. There was nystagmus of the same type to the left (diseased side), but more marked. While looking upward or downward, mild vertical nystagmus was complained of, but was not constant; while looking forward he showed no nystagmus, but convergent strabismus.

Right. Normal tuning-fork tests; normal hearing; vestibular apparatus showed typical reaction to all tests.

Left. Complete deafness with Bárány apparatus. Caloric tests showed complete loss of vestibular reaction to heat and cold. Examination on rotation chair showed the duration of the after-nystagmus in the proportion of 1 to 3.

Irrigating the right (normal) ear of the standing patient, with water below the body temperature, causes falling to the left; changing the position of the head to the right, left, up or down, does not alter the direction of the falling, and the whole body tends to fall to the left. With the Romberg test, he falls to the left. Changing of the head position does not alter this direction of fall.

Nerve Condition. Both patellar reflexes were increased, and on both sides there was failure in the finger-nose-touching test. Otherwise nerve conditions were negative.

Eye Conditions. Both fundi normal. Paresis of abducens nerve on both sides, with resulting spastic convergence. Three days later, a second examination showed that the patient could hear conversation at 3 meters with the Bárány apparatus in the diseased left ear. Irrigating the left ear with water below the body temperature for a few seconds produced a strong rotatory and horizontal nystagmus to the right; irrigating with water at 45° C., the same type of nystagmus to the left; at the same time, well-marked dizziness, nausea, and falling to the left, independent of head position. During seven weeks' observation, the condition of the eyes and nervous system showed no change. Otological examinations were made, showing non-irritability of the cochlea and vestibular part of the labyrinth. Except for the diminished hearing distance, both parts of the labyrinth exhibited no pathological change on four examinations. There was no marked difference in the intensity of the spontaneous nystagmus at the different examinations. There was no evidence pointing to any sudden non-irritability of the labyrinth during the intervals.

CASE II.—Probable multiple sclerosis. Male; previous history negative. For the last seven months at times had dizziness, tinnitus, and deafness. The dizziness was so intense that often the patient would fall upon attempting to arise. Lying, he had the sensation as if the bed

were swaying. Did not notice any difference in changes of head position. No particular position in bed was preferred.

Nerve Condition. On the right, "protensio bulbi;" to the left, lid tremor; no Graefe sign. The pupils react to both light and accommodation. Fundus normal on both sides. Visual field not diminished. Smell diminished on both sides. Corneal reflexes equal. No facial sensibility disturbance. Facial, in three branches reacts promptly; trigeminal intact. Tongue showed tremor, but no deviation. Pharynx symmetrical and reflex lively. Head positions cause no dizziness. No abnormal neck pulsation. Tremor of hands; no ataxia. In walking, swayed to right and left. Reflexes equal on both sides and prompt. No foot clonus. Some tremulous motion of foot on releasing hand. No other disturbance of bodily sensibility. An hour after this examination it was noticed that the previously existing nystagmus was no longer present. There was also at that time foot clonus and clonic reflex of the Achilles tendon when struck.

Otological Examination. Both membrana tympani were normal, with transparent view of the bony process of the incus. Coarse, horizontal, and rotatory nystagmus of varying intensity to both sides, while looking to right or left. The nystagmus to the right (diseased side) was stronger than to the left. Looking straight forward, there was no nystagmus. Looking upward and downward, a straight vertical nystagmus of varying intensity occurred.

Left Ear. Normal hearing of whisper and conversation. Tuning forks all heard normally. Rinné, positive; Weber, to the left. On account of the spontaneous nystagmus, the Bárány sight fixator was used to fix the sight, and the test showed no spontaneous nystagmus. Caloric irritability, cold and hot, showed vestibular reaction.

Right Ear. Total deafness (with noise apparatus) for speech and forks. Non-irritability of vestibular apparatus; no nystagmus upon making the rotation test. After five days another test was made, showing no change in the left ear. The right was again totally deaf with the noise apparatus, but the vestibular apparatus now reacted to heat and cold in the usual way, a rotatory and horizontal nystagmus to the left with cold irrigation, and a nystagmus of like components to the right, with water at a temperature above that of the body. When a nystagmus was caused with the patient standing erect, and he was told to stand with both feet together, he fell to the right and backward, independent of the direction of the nystagmus or position of the head. At this time there was one-sided visual paralysis to the left. Patient was examined at intervals of three to five days for two months. The eye muscles changed frequently. Abducens paralysis right, paralysis to right, and abducens paralysis left and left paralysis varied constantly, but without any diplopia. The right ear during the entire time remained deaf, and the vestibular apparatus was about evenly irritable or did

not react; at the same time, there was a constant vestibular nystagmus to both sides whose intensity seemed to be independent of the condition of the labyrinth.

Differential Diagnosis. Beck considered hysteria, a brain tumor, and multiple sclerosis. Transitory deafness had been many times noted in hysteria. Yet the changeable irritability and non-irritability of the vestibular apparatus in these cases could not be explained upon this basis. There had been also absence of all hysterical stigmata in these patients. In the first case, the neurological findings relative to the cranial nerves had been totally negative, excepting the bilateral abducens paresis. A brain tumor that could show no other signs than a bilateral abducens paresis was very improbable. The temporary non-irritability of both parts of the labyrinth had led to the diagnosis of disease of the trunk of the auditory nerve. A tumor could cause temporary non-irritability of the auditory trunk if it could show symptoms of brain pressure on or off. For example, in a hydrocephalus with acute exacerbations there would have to be other signs of increased intracranial pressure besides the auditory affection. Such symptoms had been absent in this patient; there had also been absence of choked disk. Phenomena of acute loss of function of both parts of the labyrinth with the disease situated in the retrolabyrinth had been rare, being recorded only in cases of fracture of the skull, emboli, hemorrhages, and syphilis. The "polyneuritis cereбрalis Ménièreformis," causing symptoms of both labyrinth apparatus, was also a disease of the retrolabyrinth. He therefore agreed with the proposition of Ruttin, viz., "that irritability on the part of the cochlear apparatus with intact vestibular apparatus, or *vice versa*, point to the seat of the disease as retrolabyrinthine; while acute irritability or non-irritability on the part of the vestibular and cochlear apparatus simultaneously are more often caused by endo- than by retrolabyrinthine disease." Beck cites a case of Ruttin's of isolated disease of vestibular nerve, that had been diagnosticated as brain tumor by the internists, but which was due to a rheumatic basis, and cleared up under salicylic medication within a fortnight; also a case of Neumann's, with marked deafness and non-irritability of the vestibular nerve, in which, at the same time, there had been a herpes of the pinna which cleared up after three weeks; another like case was cured by a skull trauma, etc. He reports other cases substantiating his position. Frequent and simultaneous non-irritability of the cochlea and vestibular apparatus, with return of function, have only just recently been described. They are most easily explained as pathological changes of the trunk of the auditory nerve, whereas cases in which only one part of the labyrinth suddenly ceases to functionate have often been observed. He believes that this change of function and paralysis of the different nerves and whole segments belongs to

the typical picture of multiple sclerosis.' In a like manner, the lack of harmony between the objective findings, the temporary non-irritability of the labyrinth, and subjective disturbances (less dizziness, no nausea, etc.) point toward this diagnosis. He believes the condition is analogous to that of a patient whose eye ground shows an almost normal papilla, with blindness, or relatively good sight with marked whitening of the disk. Another very interesting feature in both cases was the atypical direction of falling upon vestibular irritation, and the divergence from the normal, and the divergence in the direction of falling from the direction of the spontaneous nystagmus, when the Romberg test was practised.

Beck calls attention to Bárány's differentiation of disturbances of equilibrium resulting from vestibular disease and those resulting from cerebellar disease, and concludes that the absence of the typical responses in his cases was due to a lesion in Deiters' nucleus. In explanation, he says that in order that the changes of the position of the head during a vestibular nystagmus may cause a change in the direction of the falling, there must exist connections between the deep sensorium and the nucleus, in which the reflected influence of the vestibular nerve can exert its influence upon the bodily musculature. In this connection, Deiters' nucleus is of primary importance. It is known that the vestibular nerve has many connections with this nucleus, and that fibers run to the anterior and lateral neurons of the spinal cord from the nucleus which directly influence the bodily musculature innervation. But however close the relation of Deiters' nucleus to the deep sensorium of the nape of the neck, it is impossible that this nucleus in itself can represent a centre in which the reaction movements in vestibular irritability could be caused.

From Deiters' nucleus numerous tracts run into the cerebellum, the deep sensorium of the neck contains numerous connections with the cerebellar nuclei, and returning fibers go from the cerebellum to Deiters' nucleus. It may be assumed, therefore, that all the tracts unite in the cerebellum in order to cause the apparent reaction movement upon vestibular stimulations. One can, therefore, understand that in cerebellar disease, as well as in vestibular, disturbance in these reaction movements will show themselves. Upon the strength of this explanation, Beck assumes that in both patients, besides the focus in the auditory nerve, there was a focus in the cerebellum. In further support of this diagnosis, he brings forward a very important factor, viz., the preponderating intensity of the spontaneous nystagmus in both patients to the diseased side, and the response to the double-sided simultaneous irrigation test of Ruttin. In this test, if both labyrinths of a person with normal ears are simultaneously irrigated with water below the body temperature, the tendency of the stimulation of one offsets that

of the other, and the eyes remain at rest. If, however, one of the labyrinths is non-irritable, the response from the irritable labyrinth causes a nystagmus toward the diseased side. Ruttin assumed from this experiment that the tracts uniting the vestibular nucleus and the cerebellum possess a counteracting character. And when these tracts are damaged by any pathological process (as cerebellar tumor, cerebellar abscess) the defect in balance is evidenced by the nystagmus. Bárány and Neumann have described the spontaneous nystagmus to the diseased side in cases of cerebellar abscess.

In both of Beck's patients there was present such a spontaneous nystagmus. Its intensity was independent of any irritation of the labyrinth, and the strength of spontaneity did not vary whether the diseased vestibular apparatus reacted or not. This seemed to point undoubtedly to a central seat for the disease, in which, according to Bárány, the nystagmus never disappeared, and which was the chief differential point compared to a nystagmus in labyrinth disease. When the caloric examination of the diseased side showed that the vestibular apparatus was irritable, then the double-sided irrigation was done, having previously attached before the patient's eyes the vision direction fixator, there was no spontaneous nystagmus to be noticed. The object in applying the double-sided irrigation was to note the difference in the irritability of the diseased and the healthy side. This showed that the nystagmus was always directed to the diseased side. He was, therefore, able to say positively that there was a difference in the irritability of the two labyrinths—that either the diseased side was non-irritable (which Beck thinks most likely) or that the healthy side is hyperirritable, with normal irritability of the diseased side. In a number of cases of brain tumor, and in one case of cerebellar abscess, Ruttin had found hyperirritability of the diseased side for the caloric reaction. Yet he also reported a case of tumor in which the irritability was below the normal.

Among a large series of cases of multiple sclerosis, Beck had seen a patient who had two perforations of the posterior quadrant on one side, the other being normal. Following double irrigation, the nystagmus was directed to the diseased side, in spite of the fact that on this side the stimulus to irritation of the labyrinth must have been greater than on the other side, where there was a normal *membrana tympani*. This case seems to prove that we have to do with a condition of under-irritability. In both cases it was of interest to note the increase of the spontaneous nystagmus on the healthy side.

The accepted view at present was that a nystagmus did not take place in an individual with healthy ears because the afferent spontaneous stimuli to the nucleus were quantitatively equal. Since we are able to create a nystagmus directed to one or to the other side by irritating each labyrinth with different stimuli, when this is not the case one must

conclude that from each vestibular nucleus tracts extend to the ocular muscles of both eyes.

In an interesting paper entitled "Contribution to Knowledge of the Acute Necrosis of the Mastoid Process in Acute Otitis," Dr. Isidore Braun,¹ of Vienna, criticises the promiscuous use of the terms *caries*, *necrosis*, *osteitis*, *bone abscess*, and even *osteomyelitis*, without the realization that these terms represent entirely different pathological processes. In view of the teachings of pathological anatomy, we should keep in mind that under *osteitis* we mean the course of an inflammatory process in the bone tissue itself. This may lead further to a purulent destruction of the bone, to a bone abscess. In this case contiguous parts of the bone have broken down. This destruction may take place simultaneously or consecutively at different points. Following this, particularly in the chronic cases, granulations spring up which invade the bone in different directions, and thus we have a friable change in the consistence which we term *caries*. By this *caries* is not meant, as in ordinary surgical use, a tuberculous bone change. The *caries* of the otological terminology is caused by many pus-producing organisms of which the tubercle bacillus represents a small majority. Finally, we should designate that process as *necrosis*, in which large parts of the bone actually die off, due to disturbances of the circulation, losing their continuity with the living bone, or surrounding tissues, and thus assuming the same relation as a foreign body. They have the same reaction as foreign bodies; an inflammatory wall is developed (demarcation); finally a free sequestrum is formed which, while it remains, prevents healing of the middle ear.

He thinks that the term *osteomyelitis* should be omitted in otological terminology entirely, since there is no "myelin" or bone marrow in the mastoid process. These different processes enumerated should be differentiated, as they arise in chronic or acute purulent middle-ear disease. Koerner was the first who called attention to necrosis of mastoid in acute cases, particularly with hereditary lues, scarlet fever, measles, diphtheria, erysipelas. Herrmann also reported cases all following scarlet fever. They note particularly the quick development of the necrosis in a few days, and even in a few hours, with relatively a scarcity of threatening middle-ear symptoms, no pus retention, and with large perforations. However, in these cases there is early mastoid tenderness, swelling and infiltration of the periosteum and soft parts, which quickly spreads above and behind; yet there is no real fluctuation, with little sinking or standing off of the pinna. Hermann found streptococcus bacteriologically in most of his cases.

Otitic Meningitis. One hardly glances at a medical journal nowadays without encountering the report of cases of otitis meningitis

¹ Monatschrift für Ohrenheilkunde und Laryngo-Rhinologie, Band xlv, Heft 11.

which have been operated upon. It is with much gratification that one notices among this number an increasing percentage of recoveries. At the November, 1910, meeting of the Scottish Otological and Laryngological Society, Mr. J. Logan Turner reported the cure of 2 such cases after repeated spinal punctures, the withdrawal of large quantities of fluid, and the injection directly into the cord of antistreptococcic serum.

At the May meeting of the New York Otological Society, Dr. William Haskin reported the cure of a similar case following the removal of a large quantity of cerebrospinal fluid, and the injection directly into the cord of 40 or 50 grains of urotropin in normal salt solution. In discussing this case, Dr. J. F. McKernon reported 4 similar cases of recovery following a similar treatment. He had first attempted this treatment at the instigation of Dr. Harvey Cushing, of Baltimore, who had told him that he believed it might prove successful in such cases. At the October meeting of the Section on Otology, New York Academy of Medicine, Dr. James G. Dwyer reported 3 cases of meningitis with recovery after the use of urotropin and the Hiss extract of leukocytes. In the discussion which followed, other cases of successful treatment of meningitis following the use of urotropin or Hiss extract of leukocytes were reported.

All these reported successes in the treatment of a condition which only a few years ago was considered hopeless, is most encouraging. It would seem that the successes had been due rather to the frequent withdrawal of large quantities of infected cerebrospinal fluid followed by the direct application of antiseptic fluids to the endocranium than to the particular method of drainage of the endocranium by the operation in the dura. The early recognition of these cases, confirmed by a lumbar puncture, and the withdrawal of infected fluid has been the keynote of many reported successes.

Last year Mr. J. Stoddard Barr¹ reported an experiment on the cadaver, in which he flushed out the spinal canal and lateral ventricle, washing through a needle in the lumbar region to an incision in the lateral ventricle. This was followed by a successful effort to do the same on the living, although without any benefit to his patient, who was moribund at the time.

In a patient who had been unconscious for fourteen hours, the writer succeeded in accomplishing a free flushing of the spinal canal and lateral ventricle in a similar manner, using about 500 c.c. of normal salt solution. Upon recovery from the anesthesia, which had been given owing to the restlessness of the patient, she became perfectly conscious, and conversed with her relatives in a rational manner for nearly four hours. She then became overwhelmed again, and died at the end of about

¹ *Journal of Laryngology, Rhinology, and Otology*, vol. xxv, No. 10.

twelve hours. Recently, in another patient who had become moribund in spite of repeated spinal punctures and drainage through the dura in both the middle temporal and cerebellar fossæ, a similar flushing out of the spinal canal and lateral ventricle was successfully accomplished by the writer (although with much more difficulty than in the previous case), but without any noticeable improvement. The patient died in a few hours.

Trauma in Relation to Otology. At the March 17, 1911, meeting of the Otological Section of the Royal Society of Medicine, a very interesting discussion on the "Injuries of the External and Middle Ear," was opened by Dr. W. Milligan,¹ and continued on "Injuries of the Middle and Internal Ear," by Mr. Charles A. Ballance.² The observations of Mr. Ballance relative to the pathology of the lesions following fracture of the base and the damages to hearing resulting from explosion and loud noises, are worth careful study, particularly in connection with some work recently done by Stenger,³ in "A Contribution to our Knowledge of the Internal Ear Consequent upon Head Injuries." Stenger has experimented upon rats, attempting to ascertain the effect upon the structure of the labyrinth, resulting from blows upon the head. The animals were exposed to blows of sufficient severity to cause some concussion. Stenger based his remarks upon the individuals which recovered from the injury, using the others for controls. He found that twelve of the animals, regardless of whether the blows were light or severe, had sustained hemorrhage into the internal ear. Those which had been subjected to light blows were found to have an effusion chiefly in the region of the round window, and the basal whorl of the cochlea. The vestibule and canals remained free. In those which had sustained heavier blows the hemorrhage was more extensive, reaching as far as the apex of the cochlea, affecting the round window markedly, and also slightly the cochlear nerve and canalicular ampullæ. Where the injuries had been still more severe, the cochlear spaces were filled with blood, the round window in some cases destroyed, and hemorrhages had occurred even among the fibers of the acoustic nerve. In a number of instances degenerative changes had taken place in the cells of the organ of Corti, and even in the neurons of the spiral ganglion suspicious appearances were observed. Stenger, however, was unwilling to draw any definite conclusions from these last observations until confirmed by further experiments. The chief data obtained were the hemorrhages: "(a) Into the cochlear canal, beginning at the round window and extending to the apex; (b) into the ampullæ; and (c) between the fibers of the acoustic nerve, and especially of its cochlear branch and in the neighborhood of the lamina cribrosa. In no case was there any obvious injury of the bone; that is to say, that the conditions were those of concussion

¹ Journal of Laryngology, Rhinology, and Otology, vol. xxvi, No. 5.

² Ibid.

³ Arch. f. Ohrenheilk., Band lxxix, Heft 1 and 2.

of the labyrinth without actual fracture of the bony capsule." Stenger then proceeds to compare his results with the recorded conditions described in cases of injury to the labyrinth in man: "Injuries of the labyrinth may be divided into (1) those with transverse fracture of the petrous bone involving the capsule of the labyrinth; (2) those with longitudinal fracture of the petrous bone not involving the labyrinth; (3) those without any evident injury of bone."

The first group, that of fracture passing through the bone of the labyrinth, is naturally the severest form of injury as far as the hearing is concerned. Healing, when it occurs, leaves the patient deaf, and it is a characteristic feature of this group that the hearing may get worse during the process of repair, and that persistent vertigo is not uncommon.

The other two groups have several points in common: In both, the traumatism sets up hemorrhage, most severe in the neighborhood of the round window, because that structure is incapable of resisting sudden or violent oscillations of intralabyrinthine fluid pressure; in both, the nerve also is the seat of more or less extravasation, and in some cases the nerve trunk itself is actually torn across.

Fracture of the petrous bone along its longitudinal axis is usually a fatal accident, but, if recovery does take place, absolute loss of hearing is uncommon unless the nerve has been seriously damaged. Indeed, in contrast with the first group, hearing may actually improve after the absorption of the effused blood.

Turning to the third group, that of damage of the labyrinth without any obvious lesion in the bone, the author points out that in severe head injuries in which fracture does not occur, physical violence will still be conveyed along the lines at which fracture is most prone to take place, and, as one of these fracture lines traverse the labyrinth, a violent blow upon the cranium will be transmitted to the labyrinth and may induce disruption of the finer bloodvessels, nerve fibrils, cells, and other delicate structures of the internal ear. The effects of such physical violence are evident in the lesions he found in the rats' skulls, namely, hemorrhages, the rupture of the membrane of the round window, and of nerve trunks or branches, changes which lead to loss of function, transitory or permanent, according to the extent and nature of the damage.

In regard to the question of the more intimate injury of the cells of the end-organ and spiral ganglion, apart from the effects of grosser lesions like hemorrhage, etc., the author does not deny that comparatively trivial injuries may seriously damage, and even destroy, these structures. But he holds that no definite proof of the existence of such damage has ever been adduced, and that further investigation on the point is necessary.

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